

1-2 EDWARD VII.

SESSIONAL PAPER No. 15

A. 1902

REPORT
OF THE
MINISTER OF AGRICULTURE
FOR THE
DOMINION OF CANADA
FOR THE
YEAR ENDED OCTOBER 31
1901

PRINTED BY ORDER OF PARLIAMENT



OTTAWA

PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST
EXCELLENT MAJESTY

1902

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REPORT
OF THE
MINISTER OF AGRICULTURE
1901

To His Excellency the Right Honourable Sir GILBERT JOHN ELLIOT, Earl of Minto and Viscount Melgund of Melgund, County of Forfar, in the Peerage of the United Kingdom, Baron Minto of Minto, County of Roxburgh, in the Peerage of Great Britain, Baronet of Nova Scotia, Governor General of Canada.

MAY IT PLEASE YOUR EXCELLENCY—

I have the honour to submit to Your Excellency the annual report of the Department of Agriculture, for the year ended October 31, 1901.

I.—GENERAL REMARKS.

A synopsis of the work of the Department and of the operations of the various branches comprised therein is laid before Your Excellency. The work in each has been efficiently carried out.

The legislation affecting the Department during the last session consisted of chap. 27, 1 Edw. VII., intituled, 'An Act to provide for the Marking and Inspection of Packages containing Fruit for Sale.' This Act came into force on July 1, 1901.

The Right Honourable the Secretary of State for the Colonies forwarded under a circular letter, dated August 25, 1900, an Imperial memorandum issued by the Board of Agriculture relative to the importation of dogs into Great Britain from abroad. This Imperial memorandum will be found as an appendix hereto. (See appendix No. 37.)

By Order in Council of January 5, 1901, in virtue of the provisions of section 5, chap. 23, 61 Victoria, intituled, 'An Act to protect Canada from the Insect Pest, known as the San José Scale,' and of 63-64 Victoria, chap. 31, 'An Act to amend the San José Scale Act,' exemption from the operations of the above mentioned Act was authorized of any trees, shrubs, plants, vines, grafts, cuttings or buds, commonly called

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nursery stock from any country or state to which 'The San José Scale Act' applies ; and all importations thereof were and are permitted to be entered at the customs ports of St. John, N.B., St. Johns, Que., Niagara Falls and Windsor, Ont., and Winnipeg, Manitoba, between the following dates in each year : March 15 to May 15, in the spring, and October 7 to December 7, in the autumn ; and at Vancouver, British Columbia, during the winter months only from October 15 to March 15, at which ports they will be thoroughly fumigated with hydrocyanic acid gas by a competent government official in accordance with the most approved methods.

It was also ordered that all shipments made in accordance with the above should be entirely at the risk of the shippers or consignees, the government assuming no risk whatever, and that packages must be addressed so as to enter Canada at one of the above named ports of entry, and the route by which they are to be shipped clearly stated upon each package.

Well matured and thoroughly dormant nursery stock may be safely treated, but as there is danger of serious injury to the trees if fumigated in the autumn before the buds are thoroughly dormant or in the spring after the buds have begun to unfold, it was ordered that all stock which when received is immature or too far advanced for safe treatment should be refused entry and held at the risk of the shipper. Vide *Canada Gazette* (vol. xxxiv, p. 1268).

By proclamation dated January 8, 1901, under the provisions of 'The Census Act,' it was ordered that the following directions should be observed :—

1. That the population to be recorded shall be the population in existence on 31st day of March, A.D. 1901, and that other information to be gathered shall also have reference to the same date, unless otherwise determined by our Minister of Agriculture for Canada, as regards information under schedules 8, 9, 10 and 11.

That the procedure to be followed for obtaining the enumeration of the population shall be in accordance with the system known by the name of the *de jure* system.

2. That the division of the country into census districts and sub-districts shall correspond respectively as nearly as may be with existing electoral divisions and subdivisions, and that except as may be otherwise directed by our Minister of Agriculture the units of enumeration for census purposes shall be the polling subdivision areas of the several electoral divisions adopted for the recent parliamentary elections ; but that in territories not so defined or situated as to admit of adhering to circumscriptions already established, special divisions and sub-divisions shall be formed for census purposes by authority of our Minister of Agriculture.

3. That the sub-districts of a census district shall ordinarily consist of townships, parishes, cities, towns and incorporated villages.

4. That the census officers provided for in section 8 of the Census Act shall comprise four for each of the provinces of Ontario and Quebec and one for each of the other provinces and the North-west Territories, whose duty shall be to instruct census commissioners in the method and work of the census.

5. That there shall be a census commissioner for each census district, or two commissioners if the district is extensive or has a large bi-lingual population or comprises more than one county municipality, and one enumerator for each polling subdivision or for a group of polling subdivisions, when our Minister of Agriculture in special cases so directs ; and the duties of such officers and the period of time within which their returns and reports must be completed and made shall be as provided in

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the Act and according to the regulations and instructions authorized by the Act, or as in special cases our Minister of Agriculture may direct.

6. That as in the registration of diseases or causes of death the Bertillon nomenclature is already in use in the provinces of Ontario and Quebec and in the Republic of Mexico, and has been endorsed for adoption on January 1, A.D. 1901, for a period of ten years by the delegates of eighteen countries to the International Commission which met at Paris during the year 1900, to deal with the subject (including the delegate of the United States), and as uniformity of statistics is essential in making comparative studies of mortality, it is advisable to follow the Bertillon or International nomenclature in taking the census of mortality (schedule 3); and that, to ensure as complete a record of diseases or causes of death as possible, it is further advisable to obtain the co-operation of provincial or other local officers of vital statistics where such officers have been organized, under arrangements and terms to be sanctioned by our Minister of Agriculture.

7. That at the discretion of our Minister of Agriculture, and subject to such limitations of territory and of industries as he may determine, the census of manufactures (schedule 8), and the census of products of the forest (schedule 9), may be entrusted to one or more special agents in each province; the census of fisheries (schedule 10), subject to limitations of territory, to one or more special agents, or to the Department of Marine and Fisheries, or, in the case of any province which has assumed administration of the fisheries under the decision of the Privy Council, to the provincial officer charged with such administration, and the census of mines and minerals (schedule 11), subject to such limitations of territory and of classes or kinds of mineral products as our Minister of Agriculture shall determine, to the regular enumerators, to special agents, or to the Geological Survey, as may in each case be deemed most advantageous and expedient.

That the details of information and forms to be used shall be as indicated by the schedules following and by the instructions and blank forms issued by our Minister of Agriculture for the working thereof.

The schedules and forms are published in the *Canada Gazette*. Vide *Canada Gazette* (vol. xxxiv, p. 1318).

By proclamation, dated March 31, 1901, under the provisions of 'The Census Act,' the country was divided into census districts, and each census district into subdistricts to correspond respectively, as nearly as may be, with the electoral divisions and subdivisions for the time being; and, in territories not so defined or so situated as to admit of adhering to circumscriptions already established into special divisions and subdivisions for the purpose of the census as therein set forth. Vide *Canada Gazette* (vol. xxxiv, p. 1894).

By Order in Council of March 23, 1901, the Order in Council of January 5, 1901, was modified, and the admission, at the ports of Winnipeg and Brandon only, of importations of the 'Dakota Cottonwood,' otherwise called 'Necklace Poplar' (*Populus Monilifera*), without fumigation when shipped from and grown in the State of Dakota, was authorized. Vide *Canada Gazette* (vol. xxxiv, p. 1908).

By Order in Council of May 31, 1901, in virtue of the provisions of section 5 of the Act, chap. 23 of 61 Victoria, intituled, 'An Act to protect Canada from the introduction of the Insect Pest, known as the San José Scale,' the Order in Council of March 23, 1901, admitting at certain ports without fumigation importations of 'Dakota Cottonwood,' from the State of Dakota, was amended by adding thereto, after the

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words 'State of Dakota' the words 'or Minnesota.' Vide *Canada Gazette* (vol. xxxiv, p. 2498).

During the current year the work of organizing for the taking of the decennial census has exacted a great deal of attention and labour. It was felt important that a good deal of information which had not been before gathered in Canadian censuses should be obtained. The elaboration of the schedules for this purpose required the attention of an expert in statistics who could devote his whole time and attention to this particular labour. Mr. Archibald Blue was therefore appointed Special Census Commissioner, and has been able to carry out most satisfactorily the taking of the Canadian census. The work of compiling the information obtained is now rapidly proceeding.

During the past year I was obliged to provide for the proper representation of Canada at the International Exhibition at Glasgow and at the Pan-American Exhibition at Buffalo.

At Glasgow I was able to utilize very largely the government exhibits which had been at Paris the year before. I took advantage of the experience of Mr. W. D. Scott, who had been one of the commissioners at Paris, and appointed him the managing commissioner at Glasgow. Colonel William O'Brien and the Honourable Arthur Boyer were also appointed honorary commissioners.

Owing to the eagerness of the Canadian manufacturers to exhibit at Glasgow, notably the agricultural implement makers, the carriage makers and boat builders and furniture and heating apparatus manufacturers, the space allotted to us originally was found to be not nearly sufficient. I was obliged therefore to authorize the erection of a Canadian pavilion. This was found a great advantage, as the experience of all exhibition work has impressed on me most emphatically that the country can be best represented when all the exhibits are placed together in a special Canadian building. We renewed and added to the government exhibits which were sent from Paris, and made a most impressive display of Canadian agriculture and food products and mineral and forestry products from Canada. These attracted a great deal of attention and were the subject of most favourable and admiring comment from visitors and in the press. The manufacturers who exhibited there were able to open up new avenues of considerable trade, and not only disposed of their exhibits but received also a large amount of additional orders as a result of the Canadian display there. The Glasgow Exhibition itself was a remarkable success, having a large balance in hand after paying all expenses.

It was rather late in the season when the decision was arrived at to represent Canada at the Pan-American Exhibition at Buffalo. Mr. William Hutchison, of Ottawa, was appointed commissioner, and owing to his large experience in exhibition matters and his energy and activity, the Canadian pavillion there was promptly put up and handsomely and appropriately decorated so as to display Canadian agricultural and other products. My Department did not undertake there to make any display in the different sections. The Canadian building was more of the nature of an office for the Canadian exhibitors at the exhibition, for immigration purposes and to

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form a rendezvous and gathering place for Canadian visitors. In this regard it was eminently successful. At the same time what was in it in the way of Canadian products attracted a great deal of favourable attention and comment. The live stock exhibition at Buffalo was a special feature. In this my department took an active part. The great six months' dairy test was participated in by Canadian herds, just one-half of the entries being Canadian. The test was one as between breeds, five cows of each breed being entered in a group. It was especially noteworthy and gratifying to Canadians to find that of the five leading herds four were Canadian, only the American Guernseys (which was the leading herd) surpassing our four best herds. In the competitions for live stock Canada also carried off an extraordinary number of prizes, much larger in proportion to the number of animals entered than the United States, the only other competitor. This splendid showing has been of great value to Canadian live stock men, and has stimulated more than ever the trade in live stock between Canada and the United States, a trade which has for the last few years been so advantageous to our Canadian farmers. The French Canadian horses and French Canadian cattle made their first appearance in a great international competition, and it was very gratifying to find how well they stood and how much admiration and attention they received. Their appearance has resulted in a very considerable demand for this stock, both from the United States and other parts of Canada.

As has always been my custom, I took occasion to visit the various agricultural gatherings—the Fat Stock Show at Guelph, the meetings of the Farmers and Dairymen of New Brunswick at Fredericton, the Nova Scotia agricultural meeting at Amherst, the District of Bedford Dairymen's Association at Cowansville, and other smaller meetings.

The week of work at Guelph, in December, 1900, was especially interesting. My Department, through Mr. Hodson, live stock commissioner, undertook the management of the programme of lectures and addresses. A number of new items were introduced, notably when the experts on various classes of live stock took representative animals into the lecture hall and pointed out their excellencies and defects. This feature was so popular that the audiences overcrowded the lecture hall, many not being able to get within hearing. It was evident that the eagerness for information was only equalled by the practical and thorough nature of the addresses that were given.

The poultry show at this exhibition assumed such proportions as to be a gratifying proof of the greatly increased interest taken in this branch of production in Canada. The excellency of the entries and the great variety and number of the birds was most extraordinary.

My visit to Fredericton was the first occasion on which I had an opportunity of meeting the representative farmers of New Brunswick. The gathering was a most successful one, and I formed a very high opinion of the possibilities of agricultural development in that province as evidenced by the class of men with whom I came into contact and the evident desire for better organization and greater information shown by those present.

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Last winter I found it expedient to pay a visit to Washington for the purpose of discussing with the Minister of Agriculture of the United States and his chief veterinary adviser, the subject of tuberculosis in cattle. My own chief veterinary, Dr. McEachran accompanied me.

The Department at Washington had considered it necessary to require that all cattle entering the United States for breeding or dairy purposes should be tested with tuberculin by one of their own officers, and had declined any longer to accept the certificates of English or Canadian veterinaries. Appreciating the difficulties which this arrangement would present to Canadian exporters into the United States, I was able to arrange that the United States authorities should accept the certificates of our permanent officers. This concession was granted and the necessary instructions given to the United States customs authorities. As there is a very considerable export trade constantly going on from Canada to the United States, I found it necessary to appoint two additional permanent officers. As the time of these officers would not necessarily be always occupied in making the tests for export, I have arranged that the services of my permanent staff only shall be utilized for the testing of cattle in Canada on the demand of the owners who wish to have their herds tested at home.

I decided to send a Canadian veterinary to England to make tests for those who wished to import breeding stock from the old country. This was done so that the Canadian official test might be made before the animals were shipped from the old country, it being in the interest of importers that they should be saved the expense of the voyage and the maintenance in quarantine here in cases where the animals failed to pass the test successfully. The certificate of this officer of Canada in England is accepted by the United States authorities for cattle passing through Canada en route to the United States ; we also accepting certificates given by the United States officer in Great Britain.

Dr. J. G. Rutherford, of Portage la Prairie, was detailed for this work and spent the summer in England. It turned out to be most arduous and difficult work for a considerable portion of the time, but it served the purposes desired and was a great boon to Canadian importers of such stock.

For the purpose of discussing with the Imperial authorities the export of Canadian live stock to Great Britain, the further examination of the British markets for Canadian food products, and for the purpose of procuring a number of thoroughbred animals for the experimental farms, I proceeded to Great Britain in the spring, being absent a little over two months. I took with me Prof. Robertson, Mr. F. W. Hodson, Live Stock Commissioner, and Mr. J. H. Grisdale, Agriculturist of the Experimental Farm. The two latter were busily engaged examining the different herds in which we thought it probable we might obtain the animals we desired for the experimental farms. It was intended to import a certain number of what are called milking shorthorns, a certain number of Ayrshire cattle and a certain number of Guernsey cattle. Great difficulty was experienced in obtaining the type of the milking shorthorn that would be eligible for registration in the North American Shorthorn Register. The latter register requires an unbroken tracing to the twentieth volume of the Shorthorn Herd Book in England. We found that a very large number of the best representatives of the milk-

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ing shorthorn could not do this, having out-crosses in the latter part of their pedigree. The result was a good deal of loss of time and much travel on the part of the two officers who were charged with the finding of these animals.

In company with my officers I had the advantage of studying a number of the most celebrated herds in England and the principles and practice of breeding adopted by eminent breeders ; also of examining the methods and principles of general farming and stock keeping in the old land.

The result of this work was that we purchased and imported to Canada 10 Ayrshires, 7 Guernseys and 8 shorthorns, which animals are now safely placed on the experimental farms at Ottawa and Nappan, and are attracting much favourable comment.

We also took occasion to visit several of the agricultural fairs, notably the Royal Agricultural Society's Exhibition at Cardiff and the Highland Society's Exhibition at Inverness.

In conjunction with Prof. Robertson I arranged to meet a number of the importers and produce dealers in Glasgow, Liverpool, Manchester and Cardiff, at which places we addressed public meetings and were most hospitably entertained by the various organizations. We also had an opportunity of meeting many business men in London, Bristol and elsewhere, investigating the demands of these markets and working out the problem of how best the Canadian producer and shipper can satisfy the consumer in Great Britain. The information obtained will aid much in the administration of my department, while I have reason to believe that the information about Canada and Canadian production which I was able to lay before those with whom I came in contact, aroused an increased interest in Canada as a food producer, and in our country as a place to which the people from the old lands could advantageously come to make new homes.

The press of Great Britain paid particular attention to these subjects and gave great prominence to Canadian interests during my visit.

During my visit I had several conversations of a formal character with the Minister of Agriculture, the Right Honourable Mr. Hanbury. I laid before him most urgently the unfairness of the scheduling of Canadian cattle in view of the extremely healthy character of the stock in this country. I was gratified to find that Mr. Hanbury, both privately and publicly, was prepared to state and did state that he believed that Canada was entirely free from the contagious cattle diseases against which the English department is so strenuously guarding. He would not, however, hold out hope that they would be able to admit our cattle for ordinary distribution inland from the ports of landing. While I was there numerous representations were made to me from those who were desirous of allowing the free entry of Canadian cattle, they asking me to take part in the agitation to bring the government to do this. I felt that this was not the proper proceeding for a member of the Canadian government to take. Therefore, while I took the opportunity of stating the facts in regard to the health of our cattle, I declined to take part in an agitation in England upon this subject. The agitation culminated in an interview between the representative bodies and Mr. Hanbury, at Edinburgh, shortly after my return to this country. The result was, however, entirely

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unsatisfactory from our point of view, as Mr. Hanbury declared unequivocally that as long as he was Minister of Agriculture, the government would not admit any foreign or colonial cattle to free inland delivery in the United Kingdom. I look upon this as settling the question for some years to come, as Mr. Hanbury, undoubtedly spoke the views of the government. The present condition of affairs is statutory and consequently can only be changed by an Act of Parliament which would have to pass both Houses and be signed by the King.

Another matter on which I had a number of interviews with the Imperial officials was that of the purchase of remounts for the Imperial army regularly year by year in Canada. I had the opportunity of meeting the Commander-in-Chief, Earl Roberts, and was put by him in communication with a special committee of the War office which had this question under consideration. I found that Lord Stanley, whom I had personally known here in Ottawa some years ago, was the chairman of this committee. He was very cordial in giving me an abundant opportunity of laying our views before the committee, and from the expressions which were used by him and members of the committee, individually, I have great hopes that the report will be favourable to the continuous and regular purchase of horses in Canada for the Imperial army. No intimation has yet been received of the official report of this committee.

I feel that I must congratulate Canada upon the extraordinary development of her agricultural production. This year, so far as the great west is concerned, has been phenomenal, although I see no reason to doubt that in the future even greater crops may be produced in that fertile region of the Dominion. The varied character of farming in the eastern and older provinces has contributed to render the year's work very satisfactory, some crops being much larger than usual even if some others have been somewhat short. The live stock business has been extremely active and profitable. The general result has been a very large amount of money received by the farmers of Canada and a general and greater confidence amongst them in their business. This has resulted in a definite appreciation in the value of rural land and has stimulated many, not being farmers, to turn their attention to this industry. This is evidenced by the great number of inquiries received by me and the officers of my department in regard to the taking up or purchase of land and the asking of information in regard to the different branches of agriculture in the different sections of the country. At no time in the history of Canada has there been such a great mass of useful information available to the farmers of the country. This information is being collected most systematically and put into a form to make it very valuable and useful to inquirers, the organization of the department in this respect having been recently greatly strengthened.

In consequence of the passage by Parliament of the Fruit Marks Act, it was necessary to organize the administration and enforcement of this Act. I carried out the intentions of the Act by the appointment of a number of inspectors. I felt that as this Act was an entirely new departure, in addition to carrying out the provisions of the Act strictly, it was important that information in regard to it, its scope and its intention, should be spread amongst those engaged in the business of fruit

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growing, packing and selling. This has been thoroughly carried out, with the result that a decided improvement has taken place in the packing of fruit in closed packages for sale. In the administration of the law it was believed that it would be better to move a little slowly until such time as the packers of fruit thoroughly understood what was intended and demanded of them. Consequently, I directed my inspectors to be slow to enter prosecutions. Lately, however, we have found it necessary to undertake some prosecutions, and I am gratified to know that the working of the law has been found simple and successful. I trust that the few examples which so far it has been found necessary to make will be effective in causing a still better observance of the law, and a consequent improvement in the packing of Canadian fruit and a greater reputation for our fruit in the markets where it is sold.

II.—ARTS AND AGRICULTURE.

COMMISSIONER'S BRANCH.

GENERAL SCOPE OF THE WORK.

The general object of the work in the Branch of the Commissioner of Agriculture and Dairying is to render assistance towards the improvement of all agricultural products and the means of their production, transportation and marketing, with particular regard to those which may be grouped under the name of food products.

There has been marked progress in recent years, but methods and management have not been made better by nearly all the people who are engaged in producing foods for home consumption and for export. On the whole, greater advancements have been made in the manufacturing industries arising out of agriculture than in the production of the original commodities in the form of crops.

[The difficulties of disseminating information so as to reach all the people in a helpful way, are not realized or overcome readily. As a rule, farmers live in a manner comparatively isolated from one another, and are engaged in doing their work singly and separately, while in other occupations, closer contact and some form of co-operation have taken the place of individual management. In the making of agricultural machinery, the large factory, with its organized management and men, has absorbed the small businesses. The roadside or village artisan has no chance except as a repairer, for the manufacturing work has passed into the hands of firms which have large establishments equipped with all sorts of labour-saving machinery and devices, and manned by an army of skilled operators, each worker in his own place at his own task, and all under the direction of a few men of superior commercial intelligence and industrial talent, and specially trained. The changes that have taken place in farming from adopting mixed farming instead of simply growing grain, have been great also, and the farmers are changing their methods to meet the new conditions which have arisen ; but agriculture has not attracted the same class of help, by the consolidation of capital securing and employing the services of especially skilled and trained men to give personal direction to the operations on a large scale.

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I mention these matters to indicate that in the midst of increasing difficulties the farmers require help to assist them in the many things they have to do, and do economically, to meet the demands of the markets, which year by year grow more exacting. A superior class of food products is demanded ; consumers are getting more fastidious every year. It does not appear desirable that agriculture should be organized exactly like huge manufacturing and business enterprises, even if it could be. The welfare of the individual farmer and of the state requires that the best information available, as applied to agriculture, should be at his service. It has appeared also desirable that he should receive encouragement, direction and, where necessary, the co-operation of governments at the beginnings of his organized co-operation with other farmers, with merchants, with railway and steamship companies, for the improvement of products, the extension of markets and the improvement of transportation. The Department of Agriculture is trying to provide these forms of help.

This Branch of the Department of Agriculture has been charged with the duty of giving what assistance it can with respect to these matters, and its objects and methods have been of an educational sort. These seem to be safe and effective in helping the farmers to meet the new and old difficulties that surround them. Such forms of help gradually result (1) in increasing the intelligence of the farming population in regard to their own business, (2) in developing practical ability, and (3) in bringing about co-operation. Man for man, Canada has as intelligent a people as can be found anywhere. On the average, the farmers in Canada are not deficient in general intelligence ; but in specific knowledge regarding agriculture, they are in many cases far behind those in other countries who live on the land their fathers lived on before them, and who acquire, almost by inheritance, information with regard to the best methods of management. In a new country and place a farmer cannot find out these for himself in a lifetime. The increase of intelligence with regard to agriculture in all its branches is a purpose and object which the Department continually has before it.

Many men who are thoroughly intelligent are quite deficient in regard to practical ability ; a man may know all about a thing, without being able himself to do it properly. By giving a man object lessons, as well as information, and then letting him try for himself he will develop practical ability. One of the needs of our country is that the boys' capacity and ability to do things with their own hands should be developed and trained from the earliest years by actual practice. Until the boy leaves school and goes on the farm and works there, whatever else is neglected, his desire and power to do something should be guided into right directions and developed by practice.

Another object which the Department has in view is to bring about co-operation between all the interests and persons concerned in having the farm work and the marketing of the farm products done in the best possible way, to get the transportation companies and the commercial concerns to co-operate with the farmers towards obtaining better prices and a larger consumption in our home markets, and a larger place and better prices in the markets of the world.

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In soil and in climate—the two physical conditions that control the sorts of food that can be produced—in these two regards Canada is unsurpassed in suitability for turning out fine qualities of the main foods of the northern peoples of the world. For instance, cattle and cattle products are better in northern than in southern countries. The cereals grown in our northern regions are better than those grown in southern climes. Our wheat contains more gluten than that grown in countries further south ; and the flour made from it also contains a higher percentage of flesh-forming or nourishing parts. These are advantages which depend not only upon the ability of the people, but upon the soil and climate of the country.

The Commissioner's Branch has a good deal to do with a large number of persons engaged in industries arising out of agriculture. For instance, there are flour and oatmeal millers who have a hand in preparing the products of grains for the home and foreign markets ; and there are the curers and packers of meats and the manufacturers of cheese and butter. There are those engaged in the transportation and commerce of grain, hay, live stock, meats, butter, cheese, eggs, poultry, fruit and other products. There are those engaged in the canning of fruits and vegetables, which has become a large business ; and those engaged in raising poultry and eggs, an industry which is becoming increasingly important. The Department has to do with these, as well as with the people who live on the land and work on the farms.

The Commissioner's Branch has several divisions which take up and follow in particular detail the general work which has been mentioned. Some of these are as yet only partially organized. They are the 'Extension of Markets Division,' the 'Cold Storage Division,' the 'Live Stock Division,' the 'Dairy division' and the 'Fruit Division.' In addition to the work of each division, which unavoidably in many cases overlaps, other undertakings of a general character looking towards the advancement of agriculture have been carried on during the year.

AGRICULTURAL PRODUCTS FOR SOUTH AFRICA.

The Department has acted in the capacity of agent for the purchasing and forwarding of agricultural products on account of the Imperial Office. Up to the end of October, the quantities which have been forwarded, are as follows :—

Hay	96,320 tons (of 2,000 lbs.)
Flour	38,285 bags.
Oats	50,200 “
Beef	40,772 cases.
Jams	11,743 “

The expenditure of the Imperial War Office through the Department of Agriculture for the first cost of these products, freight charges, ocean transportation and incidental expenses, has been \$4,000,000. By the time the contracts now in hand to be filled by the end of February, 1902, have been completed, an additional expenditure on this account of over three million dollars will have been made by the Imperial War Office through the Department of Agriculture of Canada.

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SEED GRAIN COMPETITION.

With a view to stimulating increased interest in the growing and systematic selection of seed grain, a competition among boys and girls living on Canadian farms was started in the spring of 1900. To encourage them in this work, Sir William C. Macdonald, of Montreal, donated the sum of \$10,000 to be given in cash prizes according to plans which were arranged by Professor Robertson. These prizes are distributed under the supervision of the Department of Agriculture.

The competitors in the seed grain competition are growing seed grain on specially prepared plots of land, one-quarter of an acre in each plot, selecting seed each year from these plots to sow on the plot for the succeeding year. They gather large, well-filled heads from vigorous plants before the grain is cut and after all the conditions of growth have been observed, and then thresh these heads. By screening and hand-picking the large well-developed grain from those selected heads the seed for next year's seed-grain plot is secured. This means and manner of selecting seed has now been conducted for two years on over eight hundred Canadian farms, which are fairly well distributed throughout the Dominion.

EXTENSION OF MARKETS DIVISION.

By my direction and in company with me, the Commissioner of Agriculture and Dairying visited some points in the United Kingdom during the year. Addresses dealing with the progress of Canada and the improvements in Canadian food products and in the methods of transportation of the same, were delivered to meetings of importing merchants and others in Glasgow, Liverpool, Manchester, Bristol and Cardiff. Conferences were also held with importing merchants to consider improvements which they desired and which might be practicable in the handling of cheese, butter, bacon, eggs, poultry and fruit. Much valuable information was gained from these conferences, and will doubtless prove helpful in the future work of the Department.

COOLED AIR ON STEAMSHIPS.

Conferences were also held with owners and agents of steamship lines plying between ports in Canada and the United Kingdom. The question of arranging for accommodation on steamships by means of circulating cooled air through the places where cheese and apples are stowed had been taken up by correspondence; it was completed by personal interviews.

Mainly in response to representations made by the Department in previous years, a large number of steamers have been fitted with fans for the forced circulation of air through the holds and tween-decks. To try the new method which was recommended by the Commissioners for the cooling and circulating of air on steamships for the safe carriage of cheese, apples and other perishable products, the owners or agents of the Allan Line, the Thomson Line and the Donaldson Line agreed to fit up one or more steamships of each line. Four steamships were fitted and carried some cheese and apples from Montreal before the closing of navigation. Reports have been received from merchants in the United Kingdom who received cheese *ex* these

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steamships speaking most favourably of the condition in which it was carried, and advocating an extension of similar accommodation. A report was received from the Butter and Cheese Association of the Board of Trade of Montreal, as follows :—

‘The members of this association have noted with gratification the complete success of the cold air chambers system used on some steamers running from this port during the past season, and they feel they cannot exaggerate the importance of having it installed in every vessel carrying dairy produce from here next season. It is certain that having experienced the benefits of the cooled chambers last season the great majority of British buyers will next year insist on having all goods shipped in these chambers. The demand is likely, therefore, to far exceed the supply unless some effort is made to induce the steamship companies generally to turn all their available cheese carrying space into cold air chambers. This association believes it would be immensely to the advantage of the whole dairy interest were there no other way of shipping possible, than in cooled chambers, and it would heartily join in all efforts made to accomplish this result.’

A communication of a similar character has been received from the Home and Foreign Produce Exchange, Ltd., of London, England, as follows :—

‘I beg to inform you that a memorial has been addressed to me, as chairman of the exchange, in the following terms :—

‘A few steamers sailing from Montreal to London have been fitted with cool air ventilators, which have proved a great success in carrying Canadian cheese, and it is the opinion of the undersigned that the best interests of cheese importers would be served if all steamers catering for the cheese trade were so fitted. It is also the opinion of the signatories that even during the winter months it would be desirable to continue this system, as it is well known that heating in steamer’s hold is caused by storage near other cargo, which has a tendency to create heat. The signatories would be glad if the committee of the Home and Foreign Produce Exchange would take the matter up, with a view to furthering the end suggested.’

‘The importance of these representations will be appreciated from the fact that the memorial has been signed by practically all the London firms importing cheese.

‘Now that the matter has thus been brought to your notice, I would urge that no effort should be spared to give effect to the wishes of the trade.

‘Yours faithfully,

‘JOHN D. COPEMAN,

‘Chairman.’

OFFICERS TO OBSERVE HANDLING.

Several officers, in the capacity of inspectors, were appointed to observe and report upon the condition in which Canadian food products were loaded on the steamships at Montreal. During the season of navigation they reported that there had been 254 sailings of steamers of the following lines : Allan Line, Thomson Line, Elder-Dempster Line, Donaldson Line, the Manchester Liners and the Lord Line. The inspectors did not begin their work until early in June, and they reported on 204 of these sailings.

Four officers of the Department have been stationed at ports in Great Britain in connection with the extension and improvement of trade in Canadian farm products. They have been instructed to observe and examine carefully the manner in which

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the products are handled in the unloading of the steamships for the purpose of enabling the Department to take such steps as may be necessary to prevent the damage, particularly to cheese and fruit, which has been complained of by shippers and receivers from want of effective cool ventilation on steamships. The want of care in unloading, in handling on the docks, and in carting to the railways and to warehouses, has in the past broken and injured a large percentage of the packages. The representations of these officers of the Department have contributed to the means which have brought about some improvement during the season.

VARIOUS FOOD PRODUCTS.

Inquiries and examination of Canadian cheese in several of the large commercial centres revealed the fact that much of it had been landed in the United Kingdom in a heated condition that told against it very greatly in the markets. Consumers are growing less and less willing to purchase anything except mild-flavoured and rich-bodied cheese for food. It is a matter of regret that while the general quality of Canadian cheese has been, on the whole, slightly improved during recent years, the improvement in the quality of the home-made cheese in England and the more exacting demands of the market have put Canadian cheese in a less favourable position in that market than it formerly held. The two matters which require to be remedied as soon as practicable, are the prevention of the heated flavour, by having the cheese cured and carried at a temperature continuously under 60 degrees, and the use of a quality of boxes which will carry the cheese safely and be delivered in the United Kingdom in an unbroken condition.

An investigation was carried on at two cheese factories in Canada in 1899, as to the effect on the quality of the cheese of curing them during the summer months in a controlled cool temperature continuously under 65 degrees Fahr. That was continued at one factory during 1900. It is evident that through the improvement of curing rooms at or for cheese factories, and by cool chambers in the steamships, it will be possible to deliver Canadian cheese in Great Britain with the flavour and quality as fine as those of the best English and Scotch makes.

When that is done, it is evident that the Canadian cheese trade, which under the present conditions appears to have passed its maximum, might continue to grow to at least twice its present volume, within the next ten years with prices no less remunerative to the farmers than they have been in the past.

There was a great development in the Canadian butter trade during the year. The number of packages carried in cold storage from the port of Montreal increased from 227,863 in 1900, to 410,893 in 1901. Canadian butter is winning a better relative place in the markets of the United Kingdom than it has occupied at any time hitherto.

Canadian brands of bacon, hams and pork, are now among the best known in the United Kingdom and the quality is winning for them a steadily growing demand. Some complaint has been made about the quality of some Canadian bacon. A little of it was complained of as being too fat, and a proportion of it as being somewhat

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soft. Soft sides often fetch from four to eight shillings per hundred weight less than firm sides of similar weight and otherwise apparently equal quality.

It was learned from dealers in eggs that Canadian eggs were gaining in favour. The Canadian package is preferred to all others, and the Canadian eggs in size, condition and flavour are generally giving satisfaction. When the eggs were carried in cold storage on the steamships, the surface was so cold that moisture from the humid and warm air of Great Britain, was deposited on the outside of each egg. That brought about a 'mussy' condition and prevented the egg from keeping well. Consequently the importers prefer to have the eggs delivered in a cold condition to the steamship, and then carried in cool, ventilated chambers across the ocean. That leaves them with bright, dry shells when the cases are opened.

The Commissioner again reports to me that the superior qualities of Canadian flour for bread-making are not generally known by bakers or those who are directly interested. For sweetness, whiteness and strength, Canadian flour is unsurpassed. Independent analyses of various flours showed the quantity of albuminoids (flesh-forming principles in food) to be one-tenth greater in Canadian flour than in the flour imported into Great Britain from European countries. Canadian flour is generally used in these outside markets to which it is sent, by mixing with other flour to grade up the gluten strength of the latter, and so to improve the quality of the bread made from the mixture.

The export commerce of the country in most of the farm products is increasing at a very rapid rate. The following comparative statement of the value of the exports of some of the farm products of Canada during the years 1896 to 1901, shows the growth in that short period and indicates somewhat of the great possibility for further expansion of this trade :—

VALUE OF SOME CANADIAN FARM PRODUCTS EXPORTED IN YEARS 1896, 1897, 1898, 1899,
1900 AND 1901.

(Years ending June 30.)

	1896.	1897.	1898.	1899.	1900.	1901.
	\$	\$	\$	\$	\$	\$
Wheat.....	5,771,521	5,544,197	17,313,916	7,784,487	11,995,488	6,871,939
Flour.....	718,433	1,540,851	5,425,760	3,105,288	2,791,885	4,015,226
Oats.....	273,861	1,655,130	3,041,578	3,268,388	2,143,179	2,490,521
Oatmeal.....	364,655	462,949	554,757	396,568	474,991	467,807
Pease.....	1,299,491	2,352,891	1,813,792	1,955,598	2,145,471	2,674,712
Cattle.....	7,082,542	7,159,388	8,723,292	8,522,835	9,080,776	9,064,562
Cheese.....	13,956,571	14,676,239	17,572,763	16,776,765	19,856,324	20,693,951
Butter.....	1,052,089	2,089,173	2,046,686	3,700,873	5,122,156	3,295,663
Pork, bacon and hams....	4,446,884	5,871,988	8,092,930	10,473,211	12,803,034	11,829,820
Eggs.....	807,086	978,479	1,255,304	1,267,063	1,457,902	1,691,640

COLD STORAGE DIVISION.

Cold storage is intended to preserve commodities and thus avoid direct loss ; it is useful in extending the period during which they can be marketed ; and it thus gives the owners a wider chance to choose their own time for selling. The best service is for the preservation of commodities on their way to the consumers, and the less time they are on the way, as a rule, the better will be the ultimate results.

In the planning and carrying out of a system of cold storage for Canada, various interests had to be taken account of, viz. : the producers, the collecting buyers, the carriers or transportation companies, the distributing merchants and the consumers. The cold storage system has helped to prevent losses and deterioration of quality, it has given handlers a chance for more profit and left more wealth in the country. The arrangements were made mainly for cold storage for food products intended for export. Advantages have been provided incidentally for products for home consumption. With what is practically a chain of cold storage available, the superior quality of Canadian products will be further recognized by importing merchants and consumers in the countries to which they go.

COLD STORAGE ON STEAMSHIPS.

The contracts entered into with agents of steamship companies to provide a regular cold storage service for the carriage of butter and other perishable products from Montreal to points in Great Britain, in chambers cooled and kept cool by mechanical refrigerating machinery of the best and most modern sort, terminated at the close of navigation from Montreal in 1901.

From the port of Montreal, in the season of 1901, there were sailings of 24 steamers with cold storage, and most of these made several voyages each. The total capacity of those steamers per voyage to the various ports was as follows :—

	Cubic feet.
Bristol....	128,154
London....	104,807
Glasgow ..	46,044
Liverpool ..	38,846
Manchester..	23,000
	<hr/>
	340,851
	<hr/>

In addition to these, the Allan Line had the steamship *Australasian*, which was originally fitted up for the Australasian frozen meat trade. She alone was reported as having cold storage capacity of 260,000 cubic feet.

Self-registering thermometers, called thermographs, were placed on the steamers of the different lines from time to time for the purpose of recording the tempertures at which perishable products were carried. These records show that butter was carried in cold storage at a temperature ranging from 26 to 30·4 degrees. A comparatively

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small quantity of butter was carried in ordinary storage. The thermograph record for it shows that it was carried at a temperature of 71 degrees. Only small quantities of tender fruits and dressed meats were carried in cold storage during the season.

The following statement gives the number of packages of butter carried in cold storage, from the port of Montreal, during the seasons of navigation since 1898 :—

	Packages.
1898..	209,172
1899	429,734
1900..	227,863
1901	410,893

COLD STORAGE ON RAILWAYS.

Arrangements were continued for the running to Montreal of refrigerator cars fully iced from fifteen starting points on the Canadian Pacific Railway, from sixteen starting points on the Grand Trunk Railway, from two starting points on the Quebec Central Railway, from two starting points on the Intercolonial Railway, from six starting points on the Canada Atlantic Railway, and from one starting point on the Quebec and Lake St. John Railway. Six of these ran once a fortnight, the other thirty-six ran weekly.

The railway companies provided the refrigerator cars, and every car was iced to receive butter and other products requiring cold storage, at stations between the starting point and destination. Shippers who made use of these refrigerator cars were charged the regular 'less than carload rates,' and no extra charge was made to them for the cold storage services.

COLD STORAGE WAREHOUSES.

Cold storage warehouses of sufficient capacity for the trade are provided in Montreal as private business concerns. For the protection of perishable products intended for export and for the extension of business, it is desirable to have cold storage buildings at other centres. As the volume of trade at first would not likely be sufficient to induce business men to put up such buildings for the accommodation of products intended for export, a grant was offered to those who would provide cold storage buildings at central points. The grants were to be in the nature of guarantees that the earnings from the cold storage business at these points would yield at least 5 per cent on the cost of the buildings and plant.

The rates to be charged were to be satisfactory to the Department of Agriculture, and the grants from the government were not to be called upon, except to make up any deficiency between the net earnings and the sum of 5 per cent on the cost as mentioned. Advantage was taken of this offer at Quebec only.

An agreement was made with Messrs. B. and M. Rattenbury, the owners of a cold storage building at Charlottetown, P.E.I., to provide cold storage there for the use of the public at reasonable rates.

COLD STORAGE AT CREAMERIES.

To encourage the owners of creameries to provide cold storage accommodation at them to protect the butter in cold storage from the day after it is made, I caused it to be announced that the government would, subject to ratification by parliament, grant a bonus of fifty dollars (\$50) per creamery for every creamery at which the owner would provide and keep in use a refrigerator room according to the plans and regulations, during the season of 1897 ; and further bonuses of twenty-five dollars (\$25) per creamery for 1898, and of twenty-five dollars (\$25) per creamery for 1899, if and when the refrigerator room was provided and kept in use according to the plans and regulations during these years.

Plans showing the style of construction to be adopted for the insulation of old cold storage rooms and the methods of constructing new cold storage buildings and ice houses were furnished on application.

When the bonus was made available for those years, a great many of the owners of creameries did not appear to understand the benefits which would result to themselves from providing cold storage ; and some did not learn of the offer of the government bonus in 1897 in time to construct the cold storage for use during that summer. To encourage the owners of creameries to provide the cold storage which is so necessary, I intimated that the government would extend the provisions of the bonus offered in the circular published October 26, 1896.

To the owners or lessees of creameries who did not before obtain the bonus of fifty dollars (\$50), the government will grant a bonus of fifty dollars (\$50) per creamery if and when its owner provides and keeps in use a refrigerator room according to the plans and regulations during the season of 1902, and the further bonuses of twenty-five dollars (\$25) each for the seasons of 1903 and 1904, if and when the refrigerator room has been kept in use according to the regulations during these two seasons.

Thus the owner of a creamery who provides the necessary refrigerator room and keeps it in use according to the regulations during the three years ending 1902 or 1903 or 1904, as the case may be, may receive altogether a bonus of one hundred dollars per creamery.

The owners of nearly 500 creameries have provided cold storage in accordance with the regulations.

COLD STORAGE INSPECTORS.

Inspectors of cold storage visited creameries which had provided cold storage rooms through Ontario and Quebec. They also visited places where cold storage buildings were being put up for the protection of general food products of a perishable character. Another cold storage inspector, with headquarters in Montreal, inspected the refrigerator cars on their arrival, examined the cold storage chambers on steamships, and looked after any through shipments of butter or other perishable products intended for cold storage, when notified by the shippers to do so.

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LIVE STOCK DIVISION.

The Live Stock Commissioner has been developing the policy of organization, and of diffusing information. In the North-west Territories, where organized efforts for the improvement of the live stock industry were particularly needed, a horse breeders' and a cattle breeders' association have been established under capable and energetic management. These associations have arranged and conducted the territorial auction sales of breeding stock. The Maritime Stock Breeders' Association has been strengthened and brought into closer touch with this Department. The educational work planned by this association includes a maritime winter fair, to be held at Amherst, N.S., in December, along the same lines as the Ontario provincial winter fair. The establishment of the maritime winter fair is very largely due to the fact that a number of the leaders of agricultural thought, including representatives of the local Departments of Agriculture, were brought by this Department to the Ontario winter fair at Guelph last year. There these gentlemen witnessed an exhibit of fine cattle, sheep, swine and poultry in Ontario, and listened to practical lectures by experts, with the living animals for illustrations in the first part of the programme, and with the dressed carcasses of the same at a later stage of the proceedings. All the men who are sent out by this Department to do farmers' institute work, are required to attend these fairs, that they may keep in touch with the illustrations and information given at them.

TO PROMOTE SALES OF STOCK.

For the purpose of bringing the buyer and seller of pure-bred stock into closer relationship, by providing a market for the animals produced by the smaller breeder and a convenient purchasing point for large or small buyers, a system of provincial auction sales has been established in connection with the local live stock associations of the several provinces. Such sales were held during the past year at Guelph and Ottawa, Ont., at New Westminster and Victoria, B.C., and at Calgary, Alta. A large number of animals were sold at these different sales, and usually at prices corresponding with their value. Preparations for similar sales for next year are now well under way in all of these provinces. The stock sold in British Columbia was nearly all purchased in the east on order of the British Columbia Dairymen's Association, which is making a determined attempt to improve the live stock of its province. The commissioner's visit to British Columbia last spring led to the opening up of a new line of live stock trade, viz., the shipping of stocker cattle from the eastern provinces to British Columbia to be fattened on the abundant pastures of the Pacific province for the home market in the mining districts and elsewhere. To show the possibilities of this trade, it is only necessary to mention that in 1900 less than \$5,000 was paid for stock ordered in this way for the western trade, while in 1901 the amount has reached \$25,000, and orders totalling some \$25,000 or \$30,000 more are in hand, to be filled before the end of the year. In order to promote this trade the railway companies have granted much lower freight rates than formerly prevailed; and where- as a year or two ago it cost \$360 to send a car of stock to British Columbia, stockers

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are now carried in train loads at \$175 per car, and pure-bred stock at \$150 per single car.

AT THE PAN-AMERICAN EXHIBITION.

A creditable and successful exhibit of Canadian live stock was made during the summer at the Pan-American Exposition, held in Buffalo, N.Y., with the assistance of the Department. Five cows, each of the Ayrshire, Shorthorn, Jersey, Holstein and French Canadian breeds, were maintained in the model dairy competition at that exposition, with distinct credit to Canadian dairy interests. The prizes won in the general competition, whether in horses, cattle, sheep, swine or poultry, show that Canada was worthily represented.

TOWNSHIP FAIRS AND FARMERS' INSTITUTES.

An attempt has been made to improve the method of conducting county and township fairs, by sending out from the Department expert judges for the live stock classes, who explained to the exhibitors and to the spectators their reasons for placing the awards as they did. In this way it is hoped to make the judging an educational feature, instead of being merely an allotment of premiums by men who may be incompetent or biassed in their judgment. The new plan has proved so satisfactory in the Ottawa district, in the North-west Territories and in British Columbia, that a great extension of the system may be looked for next year.

Attention has been given to the establishment of well organized farmers' institute systems in the various provinces. British Columbia has taken up this work with vigour, and now has an organization covering most of the agricultural districts of the province. One series of meetings was held in the spring and another in the fall. At each meeting addresses were given by trained and capable institute speakers sent out by this Department. Two of these men also attended a number of meetings, held in connection with the Department of Agriculture of the North-west Territories, while four others conducted a summer campaign in Manitoba. New Brunswick and Prince Edward Island have been well organized for institute work, and have lately held a number of successful meetings, with the assistance of lecturers sent them from here by this Department. Series of meetings have been held in the eastern townships of Quebec, with excellent results, and it is expected that a well organized system of institutes will soon be in operation in that province. Special institute meetings, devoted entirely to the horse-breeding interests, are now being arranged for in some of the provinces.

Nearly all the important live stock record associations doing business in Canada have been incorporated under the Act of Parliament passed in 1900, and the work of these associations is now under the supervision of this Department.

Press bulletins on live stock matters are now being sent out weekly to newspapers in Canada, and it is intended in the future to issue regularly bulletins dealing each

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with some phase of the live stock industry. A bulletin of this class, a directory of the breeders of pure-bred live stock in the Dominion of Canada, with data regarding each stud, herd and flock, has been distributed.

The months of June and July were spent by the Live Stock Commissioner in Great Britain, where he made a study of the methods of live stock management prevailing there, of the markets for live stock, and of the plans used in conducting large fairs and auction sales.

FATTENING OF CHICKENS.

An investigation was made in 1898 of the method followed in Great Britain for the special fattening of chickens. I authorized in that year the establishment of two chicken-fattening stations to test the process of fattening in Canada and to illustrate how it could be applied. Trial shipments of these fatted chickens were forwarded to Liverpool and London. The reports received state that the poultry arrived in fine condition, pleased the trade well in every respect and were sold at good prices. In 1899, eight additional illustration stations were established, and the reports indicated that there was an opening for a very large trade. The fatted chickens arrived in good condition, pleased the consignees and were sold at relatively good prices.

Last year the number of stations was increased and a series of experiments conducted to ascertain if the process of fattening the chickens could be more profitably conducted by fattening the chickens in pens on the ground. This was found not to be the case. The chickens in the fattening crates made more gain in weight for the same period, and had a better quality of flesh than the chickens fed loose in the pens. The further investigations and the shipments of the chickens to Great Britain confirmed the expectation that this branch of production could be extended with much profit. Private concerns throughout Canada have sent forward large shipments of chickens which I learn have arrived in a satisfactory condition.

This year I authorized the establishment of three stations for the artificial hatching, rearing, and fattening of chickens. The eggs at these stations were purchased from farmers and hatched by incubators. The chickens were reared in outdoor brooders and when four months old were placed in the fattening crates. They were then fatted for another month and shipped to Great Britain.

The illustrative fattening stations were continued and the quality of the chickens exported to Great Britain since 1898, has steadily improved.

This year further shipments of chickens by commercial firms have gone forward with success to Great Britain, under the direction of this Department. Large concerns are rapidly developing the business by buying live fatted chickens from the farmers, and giving attention to the killing and marketing of the same.

I learn that on Canadian markets higher prices are being paid for fatted chickens than for the ordinary lean chickens, so that fattening the chickens has become a profitable business for the farmer, whether catering for the home or foreign market.

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DAIRY DIVISION.

NORTH-WEST TERRITORIES CREAMERIES.

The Department of Agriculture continues to manage the creameries in the North-west Territories. There were in operation during 1901, twenty creameries with several contributory skimming and cream collecting stations. As a result of the past season's business seven more of these creameries have, through the assessment of one cent per pound of butter, repaid the loans which were made to them by the government when the arrangement was entered into, in 1897-8.

The output of the largest creamery was 121,419 pounds of butter, being an increase of 56,000 pounds over the make of 1900.

There was a balance of revenue from the manufacturing charge of four cents per pound of butter, at several of the creameries, over the expenditure for operating and maintaining them. Any such balance in the manufacturing account is credited to the loan fund of the creamery concerned, and when the indebtedness to the Department has been paid, the balance is put to the credit of the patrons of the creamery.

A large proportion of the butter is marketed in British Columbia. A limited quantity is sent to China and Japan and also to the Yukon.

[During the past season, about 200,000 pounds were forwarded to Montreal for export to Great Britain. That course left the markets of British Columbia and the west more open to handle butter from Manitoba and other butter from the North-west Territories than they would have been otherwise.] A portion of it was not as suitable for export as the butter from the government creameries. The refrigerator car inspector at Montreal reports the butter from the government creameries as having arrived there after a journey of 2,000 miles by rail in better condition than other butter coming less than 100 miles, thus demonstrating the practicability of successfully shipping butter from the far west to England.

Four of the creameries in Alberta were operated during the winter of 1900-1901. In addition to these there will be one in Assiniboia running during the winter of 1901-1902.

CREAMERIES IN NOVA SCOTIA.

Besides the dairy station at Nappan, the Department operated two other creameries in Nova Scotia. These were built and equipped by joint stock companies of farmers themselves, one at Scotsburn and the other at Mabou. The Department charges 3½ cents per pound of butter for manufacturing and marketing. The patrons deliver the milk or cream to the creamery at their own expense.

A considerable portion of this butter is put up expressly for the West Indian trade.

The Dairy Superintendent for the maritime provinces attends organization meetings, farmers' institutes, visits cheese factories and creameries and gives advice to dairymen generally.

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OFFICIAL REFEREE FOR BUTTER AND CHEESE AT MONTREAL.

It gave me pleasure to be able to comply again with requests from representative salesmen of butter and cheese factories, supported by the leading buyers and exporters of dairy products in Montreal, and to arrange for an official referee for butter and cheese at that port. His duties are to examine any butter or cheese about the quality of which there may be a difference of opinion or dispute between the seller and the buyer.

The official referee reports having examined, during the past season, upon request, 1,924 lots of cheese and 229 lots of butter. Of this number, 83 lots of cheese and 7 lots of butter were pronounced by him as 'finest' quality in opposition to the opinions held by the buyers. In those cases the butter and cheese were accepted at full prices, after the referee had given his decision. A report on the quality of each shipment examined is sent to the representative of the factory, and a copy is given to the buyer. The referee, being an experienced cheese and buttermaker, is often able to point out to the makers of the cheese or butter in question how the defects in the quality may be remedied.

GENERAL DAIRYING SERVICE IN THE PROVINCES.

In the province of Quebec, the Assistant Dairy Commissioner has attended and addressed a large number of public meetings. He has also given a series of lectures to the students of each course at the St. Hyacinthe Dairy School.

In British Columbia, classes of instruction in buttermaking were held at four points, covering a period of a week to ten days in every case. Public meetings for the discussion of general dairying questions were held in connection with these classes. The instructors visited the creameries that are in operation in the province.

The Chief of the dairy division and his assistants have attended a large number of meetings and conventions of dairymen in the various provinces. They have also acted as judges of dairy produce at many of the leading fall exhibitions. An instructor is to be provided to assist in holding a class in cheesemaking and milk testing at Charlottetown, Prince Edward Island. The Dairy Superintendent for Nova Scotia acted as one of the instructors at the Sussex, N.B., Dairy School during its last term, and the offer of an instructor has been renewed for another year.

Several bulletins and leaflets have been issued during the year giving information upon the production and handling of milk, the manufacture of cheese, the improvement of cheese curing-rooms, &c. These publications have been freely distributed among the patrons and managers of cheese factories and creameries. A large number of technical inquiries are answered relating to the organization, equipment, and the management of cheese factories and creameries, the manufacture of cheese and butter, the testing of milk, &c. Much useful information is in this way disseminated.

BRANDING AND REGISTRATION BILL.

Under the Act passed ‘to provide for the Registration of Cheese Factories and Creameries, and the Branding of Dairy Products, and to prohibit misrepresentation as to the dates of Manufacture of such Products,’ certificates of registration have been issued to 1,109 cheese factories and creameries, and applications are being received occasionally.

EXPORTS OF BUTTER AND CHEESE.

The magnitude and growth of the export trade of Canada in dairy products is shown by the following tables (years ended June 30) :—

DOMINION OF CANADA—Exports of Dairy Products—Home Production.

BUTTER.

Year.	Quantity.	Value	To Great Britain.	To United States.	To France.	To Ger- many.	Other Foreign Coun- tries.	B.N.A. Provinces.	British Indies.
	Lbs.	\$	\$	\$	\$	\$	\$	\$	\$
1869.....	10,649,733	1,698,042	534,707	1,015,702	.....	1,496	14,870	95,777	26,986
1880.....	18,535,362	3,058,069	2,756,064	111,158	.....	.....	24,710	163,290	2,647
1890.....	1,951,585	340,131	184,105	5,059	.....	.....	29,342	119,989	1,636
1891....	3,768,101	602,175	440,060	10,054	.....	20,447	24,021	101,649	5,944
1892.....	5,736,696	1,056,058	877,455	6,038	.....	5,160	27,207	133,770	6,428
1893.....	7,036,013	1,296,814	1,118,614	7,539	.....	1,175	35,042	127,412	7,032
1894.....	5,534,621	1,095,588	936,422	6,048	1,125	.....	25,560	109,263	14,170
1895....	3,650,258	697,476	536,797	5,365	.....	267	35,028	108,439	11,580
1896....	5,889,241	1,052,089	893,053	2,729	.....	9,370	34,299	105,472	7,166
1897....	11,453,351	2,089,173	1,912,389	6,233	.....	8,513	33,490	115,754	12,794
1898.....	11,253,787	2,046,686	1,915,550	3,738	.....	17,574	31,619	51,045	27,160
1899.....	20,139,195	3,700,873	3,526,007	3,984	.....	12,384	41,810	74,813	41,875
1900.....	25,259,737	5,122,156	4,947,000	5,044	.....	7,210	43,176	66,069	53,657
1901....	16,335,528	3,295,663	3,142,353	5,839	.....	.....	39,675	44,986	62,810

CHEESE.

Year.	Quantity.	Value.	To Great Britain.	To United States.	To France.	To Ger- many.	Other Foreign Coun- tries.	B.N.A. Provinces.	British Indies.
	Lbs.	\$	\$	\$	\$	\$	\$	\$	\$
1868.....	6,141,570	620,543	548,574	68,784	.....	.....	891	1,954	340
1880.....	40,368,678	3,893,366	3,772,769	114,507	.....	.....	170	5,710	210
1890.....	94,260,187	9,372,212	9,349,731	6,425	.....	370	2,154	12,777	755
1891....	106,202,140	9,508,800	9,481,373	13,485	.....	.....	1,954	9,104	3,884
1892.....	118,270,052	11,652,412	11,593,690	39,558	2	.....	2,124	12,942	4,096
1893.....	133,946,365	13,407,470	13,360,237	23,578	.....	.....	2,689	18,679	2,297
1894.....	154,977,480	15,488,191	15,439,198	9,552	.....	173	3,036	21,948	14,284
1895.....	146,004,650	14,253,002	14,220,505	5,058	.....	16	5,463	9,785	12,175
1896....	164,689,123	13,956,571	13,924,672	10,359	299	.....	4,861	7,509	8,871
1897.....	164,220,699	14,676,239	14,645,859	4,486	94	24	5,365	11,954	8,457
1898.....	196,703,323	17,572,763	17,522,681	14,604	.....	1,428	6,889	12,784	14,377
1899.....	189,827,839	16,776,765	16,718,418	17,739	.....	.....	11,701	13,293	15,614
1900.....	185,984,430	19,856,324	19,812,670	4,836	8,774	16,651	13,393
1901....	195,926,397	20,696,951	20,609,361	37,601	465	12	15,375	16,603	17,534

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IMPORTS OF GREAT BRITAIN.

The following table from the Board of Trade returns of Great Britain for ten years (ended December 31), shows the total quantities and value of butter and cheese imported into Great Britain :—

BUTTER.			CHEESE.		
Year.	Quantity.	Value.	Year.	Quantity.	Value.
	*Cwt.	£ stg.		*Cwt.	£ stg.
1890.....	2,027,718	10,598,848	1890.....	2,144,074	4,975,134
1891.....	2,135,607	11,591,181	1891.....	2,041,317	4,815,369
1892.....	2,183,009	11,965,190	1892.....	2,232,817	5,416,784
1893.....	2,327,474	12,753,593	1893.....	2,007,462	5,160,918
1894.....	2,574,835	13,456,699	1894.....	2,226,145	5,474,940
1895.....	2,825,662	14,245,230	1895.....	2,133,819	4,675,130
1896.....	3,037,718	15,344,364	1896.....	2,244,525	4,900,342
1897.....	3,217,802	15,916,917	1897.....	2,603,178	5,885,521
1898.....	3,209,153	15,961,783	1898.....	2,339,452	4,970,805
1899.....	3,389,851	17,213,516	1899.....	2,384,069	5,503,004
1900.....	3,378,516	17,450,435	1900.....	2,705,878	6,837,883

*Cwt. = 112 lbs.

FRUIT DIVISION.

FRUIT MARKS ACT.

An Act to provide for the marking and inspection of packages containing fruit for sale came into operation on the 1st day of July, 1901. Section 16 conferred power on the Governor in Council to make such regulations as he considers necessary in order to ensure the efficient enforcement and operation of the Act. In that connection an Order in Council was passed, as follows :—

‘Whereas by section 16 of the Act 1, Edward VII., chapter 27, intituled ‘An Act to provide for the Marking and Inspection of packages containing Fruit for Sale,’ it is provided as follows :—

“16. The Governor in Council may make such regulations as he considers necessary in order to secure the efficient enforcement and operation of this Act ; and may by such regulations impose penalties not exceeding fifty dollars on any person offending against them ; and the regulations so made shall be in force from the date of their publication in the *Canada Gazette* or from such other date as is specified in the proclamation in that behalf ; and the violation of any such regulation shall be deemed an offence against this Act and punishable as such.”

‘Therefore His Excellency the Governor General in Council is pleased, in virtue of the above cited provisions of the said Act, to make the following regulations, the same to come into force on the date of their publication in the *Canada Gazette*.

‘1. The Minister of Agriculture may make appointments of inspectors and other persons for the enforcement of the Act.

‘2. Any inspector charged with the enforcement of the Act may detain, for the time necessary to complete his inspection, any shipment of fruit, in respect of which he has reasonable grounds for believing that the marking of the package or the packing of the fruit constitutes a violation of the Act ; such fruit shall at all times be at

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the risk and charges of the owner thereof ; and any inspector detaining fruit shall give the owner, where ascertained, notice that such fruit is being detained, in storage or otherwise, as the case may be.

'3. The despatch of a prepaid telegram or letter to the packer whose name is marked on the package shall be considered due notice.

'4. No person shall, for himself or on behalf of any other person, pack any fruit for sale, contrary to the provisions of the Act.

'5. Any inspector or other person who violates any of the regulations made under the authority of the Act shall for each offence on summary conviction, be liable to a fine of not less than five dollars and not exceeding fifty dollars, together with the costs of prosecution.'

A number of inspectors have been appointed to enforce the Act. Results are already apparent in the general adoption of a more businesslike system of marking packages, and in the improvement shown in methods of packing. The encouragement given by the Act to those who ship choice fruit, by preventing the sale of inferior grades under false designations, will doubtless lead to more careful grading of fruit ; and this in turn will bring about the establishment of a high reputation for the best quality of Canadian fruit, especially in foreign markets. }

CROPS.

RESULTS OF THE PAST SEASON.

During the past season Canadian farmers have been blessed with fairly good crops in most parts of the Dominion, and with especially good returns in the greater part of the western portions of the country.

Ontario.

In Ontario, the hay crop has been remarkably good, both as to quantity and quality, and most of it was well saved. In the early spring months the rainfall was considerably greater than the average of past years, while later in the season the weather was unusually hot and dry. These conditions were favourable for the hay crop, but more or less unfavourable for the grain.

Winter wheat suffered much injury from the Hessian-fly, which ravaged the fields, particularly in the western parts of the province. Rust also injured the grain to some extent. Owing to these unfavourable conditions, the crop was much reduced in volume and the grain was more or less shrunken and light in weight. In the eastern counties the returns from winter wheat have been more satisfactory.

Spring wheat has given nearly an average crop. In some districts the yield has been fairly good ; in others, owing to drought, it has fallen lower. Most of the grain, however, is plump and full. Barley, also, is about an average crop.

Oats, which is much the largest and most important grain crop grown in Ontario, occupying a larger area than wheat and barley combined, fell below the average of past years, while the quality is not up to the usual standard. This may be accounted for by the rapid ripening of the grain, owing to the unusual heat and drought in July, which in many cases prevented the heads from filling properly. In the eastern parts

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of the province, where the conditions were more favourable, the oat crop has been better.

The pea crop has been comparatively light. In some parts it has been injured by the 'weevil,' and in other sections by rain and heat.

The hot summer weather was favourable for Indian corn, which has now become one of the staple fodder crops of Ontario.] This crop has matured well and has given more than an average return.

Field roots have given a satisfactory yield. Potatoes, also, have given a crop above the average.

The apple crop in Ontario has been disappointing. Wet weather set in about a week before the blossoming period and prevailed for several weeks, and, although there was plenty of bloom on the trees, a very small proportion of it set. In some of the northern parts of the province the yield was better, but taking the province as a whole, the crop fell much below the average. Pears have yielded well and the crop of plums in some sections was heavy.

Among the small fruits, strawberries gave an abundant crop. Raspberries, however, suffered from injury to the canes in the winter, and from drought during summer, and consequently gave a poor return. Grapes, in most districts, have given a satisfactory yield.

Quebec.

In the province of Quebec the yield of hay has been unusually good and the crop was saved in excellent condition. The weather has been more favourable for the oat crop, also, than it was in Ontario, although the returns on the whole are said to have been somewhat below the average. Wheat and barley are reported as having given about the usual return, while pease have fallen somewhat below the average.

There has been an excellent growth of grass and meadows have given good pasturage, and the stock and dairy interests are prospering. In many districts the crop of fodder corn has been excellent and has matured well, while field roots in most localities have given encouraging returns. The crop of potatoes, however, has been somewhat below the average of past years.

The varieties of apples and other fruits grown chiefly in the western counties of this province have given lighter crops than usual; but prices have been high and the return correspondingly encouraging.

Maritime Provinces.

In the maritime provinces the season has been a fairly satisfactory one. The spring opened earlier than is commonly the case, and was unusually wet, so much so that seeding was very much delayed, while later in the season the weather was unusually warm and dry.

Hay has been an exceptionally heavy crop, particularly on the uplands, and most of it has been saved in good condition. Oats, barley and wheat all promised well until

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near harvest time, when continued dry and warm weather caused these crops to ripen up so rapidly that the grain in some places gave a lower yield than was anticipated, but in other localities the results were satisfactory. On the whole, however, the yield of grain is said to have fallen somewhat short of the average; but this falling off has at least some compensation in higher prices. Very late sown grain, in most instances, gave poor returns.

The Indian corn crop was unusually good and matured well. Field roots, also, have given fairly good returns. Owing to the warm and dry weather in August, the growth of grass and clover has been much less than usual, hence cattle are not in quite so good a condition as last year and dairy animals have not given the quantity of milk they usually do in this cool and moist climate, generally so favourable for dairying and stock raising.

The apple crop has been a medium one, but owing to the high prices prevailing, growers are getting very satisfactory returns. The season has been noted for producing apples a large proportion of which are of good quality. The yield of plums was very good, but the returns from cherries and pears were not so encouraging. The strawberry crop was better than the average; other small fruits gave less satisfactory returns.

Manitoba.

In Manitoba the season opened early in April, but seeding was interrupted about the middle of the month by a snow-storm; nevertheless, sowing was finished in good time. The rainfall during the growing months was above the average and the weather was very favourable for growth. August was dry and free from frost and all grain was harvested in good condition. The crops were much heavier than any hitherto harvested in Manitoba, and while showery weather late in September and early in October was unfavourable for stacking and threshing, and much of the wheat was somewhat bleached and consequently lowered in grade, the returns on the whole have been highly gratifying. This excellent harvest should prove a great impetus to farming in that part of the country and give a stimulus to business in all departments.

North-west Territories.

In the North-west Territories the spring season was backward, with cold and showery weather; hence, seeding was later than usual. Fine weather following, growth was very rapid and strong and the hay crop remarkably heavy. During June and July the rainfall was unusually large, which resulted in a very heavy growth of all crops. August was dry, with favourable weather for the ripening of cereals, and by the end of the month the harvest was almost completed. The yields of grain, particularly in Eastern Assiniboia, have been extraordinary and much in advance of any previous records. The Director of the Experimental Farms, who visited the North-west under my instructions about harvest time, described the appearance of the grain fields as marvellous and exceeding in promise anything he had ever seen before, while the area under crop was very large.

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The threshing has given results in advance of what was anticipated and the returns received by individual farmers are highly encouraging. Following the harvest, there were rain-storms at intervals of some weeks, which interfered much with the stacking and threshing of wheat. This resulted in the bleaching of the grain in the stook, and consequently in depreciation in grade ; but the loss from this cause will not be sufficient to materially lessen the large profits which farmers will make from their crops this year in that favoured district. Oats and barley, although less important crops there, have given wonderful yields.

In Saskatchewan also, the growth has been remarkable, and the grain crops very large. In this section, stock-raising forms an important element in farming, and the great growth has given an abundance of fodder, which farmers can profitably use in connection with this part of their business.

Under my instructions, the director also visited southern Alberta, where the stock industry has been rapidly developed. He reports very satisfactory progress in this direction. In some of the drier portions of the country, where irrigation has been introduced, settlement has progressed very rapidly, and the newcomers have had good crops. The recently constructed irrigation ditches, extending for over one hundred miles, bring the mountain streams out on the drier plains, and permit of the irrigation of the crops over a very wide area. Towns are springing up, and growing rapidly, along the line of the main irrigation ditches, a large area, including many thousands of acres, has been under crop during the past season, and the returns have been very satisfactory.

British Columbia.

In the coast climate of British Columbia, the season has, on the whole, been a very favourable one for hay, grain and root crops. Oats, wheat and barley have given unusually heavy returns, much above the average. Field roots and fodder corn also gave remunerative crops, while the yield of potatoes was very large.

The season in this part of British Columbia has not been favourable for fruits. The early part of the spring was wet and cold and the fruit did not set well, and a light frost in April, when the fruit was well advanced, injured the crop considerably, so that the results were disappointing.

In the drier portions of this province in the interior the fruit crop was an excellent one. Here the apples, pears and plums were very fine and brought good prices in the mining districts also in Manitoba and the Territories. Other crops were also good in the interior of the province.

CATTLE TRADE FOR YEAR ENDED SEPTEMBER 30.

IMPORTATION OF LIVE STOCK.

The importation of horses and mules, cattle, sheep and swine into the Dominion reported during the past season was as follows :—

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Horses and mules..	10,935
Cattle..	8,478
Sheep....	88,639
Swine..	146

The above were brought in at various points as shown in detail in the reports of the Chief Veterinary Inspector (See Appendix No. 13).

EXPORTATION OF LIVE STOCK TO EUROPE.

The exportation of live stock from Canadian ports for the year ended September 30, 1900, was as follows :—

Horses....	3,222
Cattle..	117,688
Sheep....	73,184
Swine....	Nil.

EXPORTATION OF CATTLE TO THE UNITED STATES.

The number of Canadian cattle exported to the United States during the past six years, was as follows :—

1896..	1,646
1897	57,857
1898	88,605
1899	85,240
1900	86,898
1901..	46,244

EXPERIMENTAL FARMS BRANCH.

Fifteen years of steady, practical work, covering all branches of agriculture, horticulture and arboriculture, have given ample demonstration of the great usefulness of these Dominion institutions to farmers in every part of Canada. Object lessons of the most convincing character have been presented to the many thousands of farmers who have visited these farms in person and the visitors have carried away with them information which has been put to practical test on their own farms with the result of increased profits in their business. To the larger farm population, made up of those who have not the opportunity of visiting the Experimental Farms, the excellent reports prepared by the several officers of these institutions are available, being freely sent to all who ask for them. Thus, the information gathered is being very widely distributed. Fifteen years ago farming was conducted in a very different way from what it is at present, and the farmer occupied a much inferior position in the estimation of his fellows. Since then, his knowledge of his business has been greatly advanced and his material prosperity correspondingly increased. The Experimental Farms were among the first agencies established for the improvement of farming and the great strides which have been made along all the lines comprised in this national industry owe much to the sound principles on which the

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work of these farms was based and to their consistent demonstration and advocacy of the best methods.

The necessity of a thorough preparation of the soil for crop, varying in its character to suit the different climatic conditions in the Dominion—the advantages of early sowing—the economy of using barn-yard manure, as far as practicable, in a fresh or unrotted condition—the increase to the fertility of the land brought about by the ploughing under of crops of green clover—have all been presented many times over and proven in the most convincing manner. Ample demonstrations have been made as to the inherent vigour of certain strains of seeds resulting in greater productiveness. The importance of selecting for seed such larger yielding sorts has been repeatedly shown and the results which have been had, in larger crops by the choosing of such sorts, have awakened a great interest in the subject in the minds of intelligent farmers all over the country, and many have been induced to follow the teachings and example of the Experimental Farms with the best results.

IMPROVEMENT OF SEED.

The systematic testing of promising varieties of agricultural crops obtainable in different parts of the world has been continued and the results of these tests, which show the relative positions occupied by these new sorts as to cropping power, are given from year to year in the publications of the Experimental Farms. Varieties which prove of special promise after being tested at the several farms, are grown on larger areas and the seed thus obtained distributed freely among farmers in all parts of the country. In this way the farmers of the Dominion are put in possession of the very best and most productive varieties of seed grain, pure and true to name, at no cost to themselves beyond the labour of looking after the growing of the seed. For the past six years more than 30,000 farmers have participated annually in these co-operative tests, about sixty tons of seed being yearly distributed for this purpose. This work has had a wide educational effect. It has placed Canadian farmers in the van as to knowledge of the best and most productive sorts of agricultural products. They have learned to observe the characteristic differences in varieties, and their powers of observation and comparison thus awakened, they have been led to bring these faculties to bear on other problems in their business, to their individual advantage and profit. Their neighbours, in turn, have become interested in this work, and have benefited thereby, and the good influence has thus been rapidly extending through all sections of the farming community.

The new feature in this annual distribution introduced, under my instructions, three years ago, has made this work increasingly beneficial. Under this new arrangement, larger samples than those hitherto sent have been forwarded, the seed sent out being sufficient for one-tenth of an acre. In this way the relative yield per acre of the varieties under trial has been ascertained and reported on by practical farmers in every agricultural constituency in the Dominion.

NEW FRUITS FOR THE COLDER SECTIONS OF CANADA.

Further results have been had with cross-bred seedling crab apples, which have shown themselves hardy enough to endure the unfavourable climatic conditions of

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winter in the North-west country. From the new sorts which have fruited during the past season, additional promising varieties have been chosen which will be propagated for further distribution.

PAN-AMERICAN EXPOSITION, BUFFALO, N.Y.

A very comprehensive and attractive exhibit of agricultural products was prepared by the Experimental Farms for the Buffalo Exposition. This was displayed in the Canadian building, where it almost filled the central court. Grain in the straw formed a prominent feature in this exhibit, and the fine, well matured heads, with long and bright straw, especially of that from the Experimental Farms at Brandon, Man., and Indian Head, N.W.T., all artistically arranged, were much admired. Large collections of all the best varieties put up in small bunches, labelled and shown under glass, formed a very instructive feature in this exhibit. Large numbers of different sorts of cereals of very fine quality were shown in glass jars of different sizes, tastefully arranged on stands. A general display was made of many other sorts of agricultural products, including a good collection of the more important grasses grown in Canada. A fine exhibit was made of the honey produced at the apiary of the Central Experimental Farm. The Canadian agricultural display was generally admitted to be the finest exhibit of the kind on the grounds.

GLASGOW EXHIBITION.

Considerable quantities of grain, both cleaned and in the straw, were also sent forward to Glasgow from the Experimental Farms. These exhibits formed a very attractive feature. The high quality of the grain and the brightness of the straw were the subject of many favourable comments by visiting farmers from all parts of Great Britain and the continent. Later in the season, a fine representative collection was sent forward of many sorts of grain from the several Experimental Farms, the growth of 1901. These exhibits reached Glasgow in good condition and in time to be shown for several weeks before the close of the fair. They were displayed in a separate group and attracted much attention.

Acting on my instructions, the Director of the Experimental Farms brought together an excellent collection of fresh fruits, chiefly apples, grown in 1900, which were kept in cold storage in Canada until early in the spring of 1901, then shipped to Glasgow in cold storage, and stored under like conditions there. These fruits which consisted chiefly of our best commercial varieties of apples, were shown in a fresh condition during the whole period of the exhibition, being renewed from time to time as they became shrivelled or decayed from exposure and in this way an excellent display was maintained to the end. The superior characteristics of Canadian apples were thus brought prominently under the notice of a vast number of people who visited this notable exhibition.

CENTRAL EXPERIMENTAL FARM—DIVISION OF AGRICULTURE.

The farm proper, consisting of about two hundred acres of arable and pasture land, is under the immediate supervision of Mr. J. H. Grisdale, who is likewise in charge of all animal husbandry and dairy work conducted thereon.

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The work in field agriculture during the past year has been along several lines, the (a) study of rotations, (b) testing of methods of cultivation, and (c) determination of cost of production of digestible dry matter in different forms being the chief.

Some valuable data alongs these lines have been secured, a full report of which may be found in the Agriculturist's part of the Experimental Farms report for 1901.

In animal husbandry experiments have been, and are being, conducted to ascertain the values of different feeding stuffs, both coarse and concentrated, for the production of milk, beef, mutton, and pork. An effort is being made also to gain some information as to the comparative economy of feeding rations of narrow and wide nutritive ratios for the production of milk, and to ascertain their influence upon the quality of the milk produced. A series of experiments, having in view the determination of the influence of time of milking upon the quantity and quality of milk produced by cows, has just been concluded. The results are interesting and conclusive.

With steers, a number of experiments under way are for the purpose of ascertaining the comparative economy of feeding aged animals (3 year olds) loose and tied, of feeding calves, yearlings, two year olds, or three year olds. The above is in addition to a study of economy of feeding well from birth to block, as contrasted with feeding sparingly till the animals is two years old, then finishing of for shippers.

With sheep, work has been done to ascertain the best conditions for the production of good mutton carcasses by breeding, as well as by feeding, it being well known that both factors enter materially into the results.

In pork production, the investigations have been along the lines of economy of different grain and pasture or roughage feeding stuffs, and the effect of these feeds upon the quality of the finished product.

A large number of pure bred, imported animals have been added to the herds and flocks. They are as follows : Shorthorns, 3 cows, 2 heifers, 1 bull calf, 1 cow calf ; Ayrshires, 1 bull, 4 cows, heifers ; Guernseys, 4 cows, 1 calf.

Sheep : Shropshire, 1 ram, 5 shearling ewes, and 4 ewe lambs. Besides the above, 1 Yorkshire sow, 1 Tamworth sow, 1 Berkshire boar and 1 sow, 2 large black boars and 2 sows. This is the first importation of pigs of this latter breed into Canada.

DIVISION OF HORTICULTURE.

In the Horticultural Division are included the fruits, vegetables and tobacco, the arboretum and botanic garden and forest belts. The principal experiments with fruits are to determine the hardiness, productiveness, quality and freedom from disease of the different varieties ; but experiments in various methods of propagating, grafting and cultivating are also conducted. Experiments are also carried on in the orchard with cover crops, which are very useful in preventing injury to the roots of trees during winter. The investigation and treatment of diseases of fruits are also undertaken by this division.

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Fruits.—Owing to wet weather during blossoming season this year, which prevented proper fertilization of the flowers, the crop of fruit was not so large as it would otherwise have been. The winter, also, was severe throughout this district, and while some fruits did not suffer much, the raspberry crop was practically a failure, the canes having been badly winter-killed. Notwithstanding the unfavourable winter and spring, a number of varieties fruited which had not done so before, and careful study was made of them. The data accumulated from year to year are very valuable, making it possible to recommend certain varieties with fair likelihood of success. There has not yet been found a hardy late keeping dessert apple of the best quality suitable for Ottawa and similar eastern and northern climates, which would compare with the most valuable apples in the best apple districts. In order to try and obtain such an apple, a seedling orchard was planted at the Central Experimental Farm last spring, comprised of seedlings raised from seeds of the best apples ripened at Ottawa. It is hoped that from these a suitable variety will be originated. As the European and Japanese varieties of plums do not succeed well at Ottawa, special attention is paid to the American plums, and a large number of these are being tested. Seedlings are also being grown and some of those which have fruited have proved of much value.

A bulletin on apple culture was published by this division this year, for which there has been a large demand.

Spraying.—The fruit trees were sprayed this year as usual and the results were, on the whole, good, there being practically no spot on the apples. The potato crop in the Ottawa valley was light this year, having suffered from wet weather in the summer and from blight and rot in the autumn. An experiment conducted to demonstrate the value of spraying with Bordeaux mixture for the prevention of blight on potatoes gave very marked results and showed the necessity of this work, especially in a season like the last.

Forest Belts.—The various plantations which comprise the forest belts are most of them doing well, but here and there where a species has not found suitable soil the trees are not making as rapid growth as they otherwise would. In some places where the trees had not succeeded new plantations were made and different methods of planting adopted. The measurements of the growth of the most important timber trees in the belts were again taken this year.

Arboretum and Botanic Garden.—The educational value of the arboretum and botanic garden is increasing year by year, and, this season being favourable for vigorous growth, nearly everything looked well. The hardiness and growth of the different species and varieties are recorded each year, and a large amount of useful information is thus obtained.

DIVISION OF ENTOMOLOGY AND BOTANY.

The year 1901 has been no exception to the general rule in the constant demand for information from the Entomologist and Botanist and his assistants. During the year over 3,000 letters have been received from farmers and others concerning injurious insects, weeds, and allied subjects. The investigations of the life-histories of many injurious and beneficial insects have been paid special attention to, and the

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study of the improvement of remedies has been advanced considerably. The collections of insects and plants in the division have been materially increased, and their arrangement for exhibition to visitors is progressing rapidly. A large number of cases are now in order and have proved a great attraction, not only to farmers, but to students of natural history and the scholars of the public schools.

The experimental grass beds have been a constant source of interest, particularly to the large number of agriculturists attending the various excursions during the summer. Many farmers' institute and other agricultural meetings have been addressed by the Entomologist and Botanist, on subjects within the scope of his division, the useful information thus given proving acceptable to the hearers, and at the same time a good opportunity is taken advantage of for bringing the use of the important work of the division before the farmers.

In July last, at the invitation of the Department of Agriculture for Manitoba, the Entomologist and Botanist proceeded under my instructions to that province to investigate and give advice concerning a rather serious outbreak of locusts. This outbreak covered a portion of the country infested in 1900, but extended to other localities not then affected. The true Rocky Mountain locust was found in one or two places. Perhaps the most widely distributed and destructive species was the Lesser Migratory locust. The Pellucid locust and Packard's locust were also present in large numbers, together with several others of less importance. Remarkably satisfactory results were secured by those who were wise enough to make use of the remedies recommended through the Provincial Department of Agriculture, and a most useful modification of the poisoned bran remedy was devised by Mr. Norman Criddle, of Aweme, by which fresh horse droppings, which were noticed to be particularly attractive to locusts, were substituted as the vehicle for distributing the poison instead of bran, which of course costs money and is more difficult to obtain. This proved to be an exceedingly attractive and fatal bait, by which the crops were effectively protected.

From Manitoba the Entomologist and Botanist at the request of the government of the North-west Territories, held in conjunction with Mr. Angus Mackay, the Superintendent of the Indian Head Experimental Farm, a series of farmers' meetings along the Edmonton branch of the Canadian Pacific Railway. These meetings were very successful, both with regard to attendance and to the interest evinced.

In view of the extensive depredations of the Variegated Cutworm in British Columbia in 1900, and the anxiety as to the possible recurrence of this insect, I instructed the Entomologist and Botanist, at the request of the provincial government, to visit some of the localities where loss from this insect had been most complained of. Consequently, investigations were made and meetings of farmers were held during the month of August at several points in British Columbia. As was anticipated in the exhaustive article on the Variegated Cutworm, published in the Experimental Farm Report for 1900, there was no destructive occurrence of the species this year, and in one place only, namely, in the Nanaimo district, were a few specimens found.

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Among the insects which have demanded special attention during 1901 are the following :—

The San José Scale.—The fumigating stations at St. John, N.B., St. Johns, Que., Niagara Falls and Windsor, Ont., Winnipeg, Man., and Vancouver, B.C., have been maintained and have been so successful that no well-founded complaints either of living scales being found on the trees, or of injury to the latter, have been received, although this work has been closely scrutinized, particularly by those who did not appreciate the great danger of allowing the importation of this insect. Extensive and important experiments have been carried on by the provincial government of Ontario, and by the State Entomologist, of Ohio. The Dominion Entomologist has kept in close touch with the officials in charge of these experiments and has visited with them all parts of their work. On the whole, these experiments have been very satisfactory, and it may now be said that practical remedies have been discovered by which the scale can be controlled on infested trees, by persistent treatment, to such a measure as to allow of the production of a paying crop, and without injury to the trees. These remedies are Whale-oil Soap in the proportion of $2\frac{1}{2}$ pounds to 1 imperial gallon of water, Crude Petroleum, 20 per cent of a mechanical mixture with water, but not more than one quart of oil to an average sized bearing peach tree, and Fumigation, for small trees with hydrocyanic acid gas.

The Hessian Fly.—Great injury was done by this insect to the fall wheat crop sown in 1900 and also to the spring wheat of 1901. From present indications the attack on fall wheat this autumn is considerably lighter. This is undoubtedly due to farmers having adopted the advice given by entomologists as to sowing later than is the usual custom.

The Grain Aphis.—Wheat in the North-west was in some places badly injured by this insect.

Cut-worms.—The oat crop in Manitoba was very seriously lessened by cut-worms (*Carneades ochrogaster*), hundreds of acres in some cases being cut down by them, so that the crop had to be resown. Useful advice was given by the division as to the time when it would be safe to resow, and as to remedies.

Canker-worms.—These destructive caterpillars did much harm to some orchards in western Ontario. Early and persistent spraying is the proper remedy, combined with the banding of the trees in autumn.

The Black Cherry Aphis has been abundant and troublesome in Ontario, Quebec and Nova Scotia.

The Birch Skeletonizer.—The caterpillars of a small moth (*Bucculatrix canadensisella*), which did much harm in 1892, appeared again this year, and in the month of August very seriously disfigured birch trees throughout the province of Ontario. By the 1st September the foliage of birches had been reduced to a lace-like skeleton, by myriads of the small caterpillars, or had already dropped from the trees.

The Buffalo Carpet Beetle.—This pernicious enemy of the housekeeper is spreading rapidly through Canada. It has been found destructive in houses in many parts of Ontario and has lately been received from the Eastern Townships of Quebec.

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DIVISION OF CHEMISTRY.

An outline account of some of the more important investigations conducted during the past year by this division may be given as follows, the data in detail and conclusions therefrom appearing in the annual report of the Chemist for 1901.

Soils.—An important series of soils from the reclaimed marshes bordering on the Bay of Fundy has been submitted to careful and complete chemical analysis. Since the results show the character of these tide-deposited soils before and after cultivation and under varying conditions of drainage and tillage, the data obtained will prove of more than ordinary interest to farmers in the maritime provinces cultivating similar lands. Suggestions are made for the economic maintenance of the fertility of these soils, many of which have in the past been amongst the most productive of the Dominion.

Special examination has been made of a number of soils, both virgin and cultivated, from various parts of Canada to ascertain their adequacy or deficiency in lime. In many instances it has been found that soils otherwise rich in plant food are poor in available lime, and this is true not only of low-lying, sour and mucky soils, but frequently also of upland and apparently well aerated loams. The judicious use of lime (or compounds containing it, such as marl and wood ashes), especially in conjunction with organic manures, has been emphasized, both for sandy and heavy clay soils, in which it will not only act beneficially in furnishing plant food, but also in improving tilth.

The Relation of Cover Crops and Surface Tillage to the Moisture Content of Soils.—This experiment included the estimation of the moisture fortnightly throughout the summer and autumn in orchard soils, (a) under a cover crop of clover, and, (b) under cultivation. The data obtained are of particular interest to orchardists and fruit-growers, for they furnish evidence of an exceedingly marked character as to the principles and value of this new and, in many districts, most effective system for the maintenance of fertility and the conservation of moisture in orchard soils.

Naturally-occurring Fertilizers.—These include marls, swamp mucks and deposits of an alluvial character, both of fresh and salt water origin, sea-weed, eel grass, &c. Many of such materials have been shown to contain notable amounts of plant food and, with suitable treatment, to be of considerable value to farmers residing in the neighbourhood in which they occur.

Fodders and Feeding Stuff.—Many milling and other by-products upon our markets, including the various meals from the manufacture of corn starch, as produced in Canada, have been analyzed and their relative feeding value determined. As there has been a considerable increase in the price of these concentrated feeds lately, it behooves the stock-raiser and dairyman to carefully look into the nature of such materials as he may find it necessary to purchase. Protein and fat are the two most important constituents, and it will be according to the percentages in which they exist that these feeds must be valued. These 'concentrates' differ widely in character, and it is only by consulting such data as are to be found in the Chemist's report on this subject, and using judgment, that economic feeding and milk production can be carried on.

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The composition of the ordinary farm roots has again been a matter of research. The value of sugar beets as fodder as compared with mangels, carrots, turnips, &c., has been determined and much useful information generally regarding roots has been obtained. Thus it was found in the examination of mangels that the portion of the root growing above ground contained considerably less sugar than the portion beneath the soil, indicating the value of 'earthing up,' and also of the growth of such varieties as possessed a natural tendency to keep under ground—provided, of course, they gave a satisfactory yield.

In connection with this branch of the work, the following researches are now in progress and will be dealt with in the forthcoming report :—

1. *The composition of Indian corn and of clover before and after ensiling.*—This investigation will, we trust, throw some light upon the changes in composition undergone by these important fodder plants during ensiling, and the relative feeding value of the material as it goes into and comes out of the silo.

2. *Corn in hills and drills.*—The yield of real cattle food obtained per acre from Indian corn sown in hills, as compared with that sown in drills or rows, is being determined.

3. *Clover.*—To ascertain whether the plan of two or four cuttings of this plant during the season is the more economical, analyses have been made of the crops obtained under the different systems.

Chemistry of Insecticides.—Several investigations have been made in the laboratories in connection with the preparation of these compounds, and the character of certain newly introduced insecticides ascertained.

Soft Pork Investigation.—This work, begun some three years ago, has been brought to a successful conclusion during the past year, and the results and conclusions therefrom issued in a bulletin, No. 38, Farm Series. Among other deductions, it may be noted that the quality of the pork produced is controlled very largely by the character of the food used, and that while Indian corn and beans undoubtedly tend to the production of soft pork, this tendency can in a large measure be counteracted by the use of skim milk.

It was found that with all classes of rations skim milk invariably gave a firmer pork than the same ration without skim milk.

Well Waters.—Nearly one hundred samples of well waters from farm homesteads were forwarded for examination. Sixty-five of these were submitted to analysis and reported upon. Insufficient quantity and other causes prevented any useful examination of the remainder.

Samples Received.—During the past year 501 samples were received at the Farm laboratories for examination. These comprised soils, feeding stuffs, fertilizers, &c., &c., and came from all parts of the Dominion. As far as opportunity permitted, or the nature of the case demanded, these samples have been examined. In certain instances, matters of general importance to the farming community have in this way been brought before our notice, but, naturally, many of the samples have a personal interest to the sender only, and in such cases their analysis could not be undertaken.

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Tuberculin.—During the twelve months ending October 31, 1901, 8,164 doses of tuberculin have been prepared and forwarded by this division to the Government Veterinary Inspectors.

Correspondence.—The letters received by this division for the same year ending October 31, 1901, numbered 1,213 ; those despatched for the same period, 1,127.

POULTRY DEPARTMENT.

In this division of the Farm work some new breeds of poultry have been introduced during the past year. Many experiments have been carried on in the breeding of different varieties, also in cross-breeding and in the artificial hatching and raising of chickens. Successful efforts have been made by special feeding to bring on early moulting so that the hens may be brought to lay earlier in the winter. Tests have also been made as to methods of feeding to bring about the largest production of eggs at the time when they command the highest prices. A comparison of the different breeds under trial as to their powers of annual egg production has also been made and the results recorded. Further experiments have been carried on to gain information as to the rapidity with which the different sorts may be fattened and their relative value for the table ascertained.

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

At the Experimental Farm at Nappan, N.S., the experiments conducted have been planned with the object of making them specially useful to the farmers of the maritime provinces. These include trials of the most promising varieties of cereals, fodder corn, field roots and potatoes, to ascertain how far the sorts under test are adapted to the conditions which prevail in these provinces. Experiments have also been conducted with mixed grain crops, with sugar beets, with different varieties of buckwheat and many other agricultural products. Further trials have also been made with different fertilizers to gain information regarding their effect on the more important farm crops. Additional experience has also been had in reference to the question of the rotation of crops. Many samples of promising sorts of grain are distributed among farmers every year for test.

Some useful additions have been made to the dairy herd by the recent importation of valuable animals from Great Britain, notably Guernseys and Ayrshires. The flock of sheep has also been greatly improved by the addition of a number of pure-bred Shropshires and Leicesters. Further experiments have been conducted in the feeding of steers of different ages, also in the feeding of swine.

In the horticultural branch, additions have been made to the varieties of fruits under cultivation. Experiments have been instituted to demonstrate the value of spraying to subdue injurious insects and destructive fungi. Tests have also been made with remedies for scale insects on apple trees ; also on other insect pests. A large number of trials has been made with different sorts of tomatoes, cabbage, cauliflower, pease and beans to ascertain which are the earliest to mature, the best as to quality and the most productive in that climate.

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Many additions have been made to the groups of herbaceous perennial plants, and to the ornamental trees and shrubs, concerning which there is an ever-increasing demand for information. A very fine display of bloom from annual flowers was made during the season and this was much admired by visitors.

EXPERIMENTAL FARM FOR MANITOBA.

The Experimental Farm at Brandon has many attractions for the farmers of Manitoba, and thousands of them visit it every year seeking information on many different subjects. On the farm they find many demonstrations along different lines of agricultural and horticultural work. Among the agricultural tests, there are experiments with all promising varieties of cereals, including the newest sorts obtainable, to test their relative merits as to earliness and productiveness—trials as to the best methods of preparing the soil for crop, the best time for sowing, the quantity of seed to be used per acre and the depth in the soil which it should be placed for the best results. Fodder crops, grasses, field roots and potatoes have also claimed much attention and the results of many useful experiments along these lines are given each year in the annual report of the Farm.

Many varieties of the Siberian Crab (*Pyrus baccata*) and the cross-bred sorts obtained therefrom, are under test. All the varieties so far tried have proved quite hardy. Several useful sorts have borne fruit and the outlook along this line is very hopeful. Many varieties of seedling plums also fruited during the past season, some of which are of good size and very fair quality. Additions have been made to the small fruits under test and some new sorts of forest and ornamental trees and shrubs have also been added to the list for trial as to hardiness and general usefulness. Ornamental plants have claimed further attention, especially hardy bulbous and herbaceous species of a perennial character. Information as to the results of these trials, widely spread, will enable settlers to make their homes more attractive and hence lead to greater contentment.

Many sorts of vegetables have been tried and lists published of those suitable for farmers in Manitoba. A large distribution has been made this year of hardy trees and shrubs and seeds of forest trees and samples of seed grain, and potatoes, also samples of the seeds of grasses. These annual distributions are much appreciated and have proved a great boon to the farmers of Manitoba. Fine displays of grain were sent also from this farm to the exhibitions in Glasgow and Buffalo.

At my request a large quantity of young forest trees have been grown from seed at Brandon for the use of the forestry branch of the Department of the Interior.

Experiments have again been conducted in the feeding of steers, swine and poultry, also with bees. Excellent collections of cereals and other agricultural crops were prepared at this farm for the Glasgow and Buffalo exhibitions.

EXPERIMENTAL FARM FOR THE NORTH-WEST TERRITORIES.

The good influence of the work of the Experimental Farm at Indian Head on the farmers in that part of the country has been manifest for some years past in the in-

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creased crops produced in that district. The influence which a proper preparation of the soil in that climate has had on the volume of the grain crops, has been very marked, especially in regard to summer fallowing. The demonstrations which have been made on the Farm along that particular line of work have been so successful in bringing increased crops that farmers in that vicinity have followed the example given them with great profit. The agricultural experiments conducted during the past year have covered a wide field, including trials of all the more promising sorts of cereals, Indian corn, field roots and potatoes, and much valuable information has been gathered for the forthcoming report. With other fodder plants and grasses many useful tests have been made. The Awnless Brome grass has been a great success, large fields on the experimental farm having given during the past year an average of $3\frac{1}{2}$ tons to the acre of cured hay. The variety known as western rye grass has also succeeded remarkably well.

Many experiments have been carried on with such garden crops as small fruits and vegetables, with much success and information of value to farmers has been gained in reference to the quality of the different sorts tested and their usefulness when grown in the north-west climate. Experiments have also been conducted in the rotation of crops.

The cattle composing the herd at this Farm consisting of Shorthorns, Ayrshires and grades are making satisfactory progress. Further feeding experiments have been conducted with steers and swine to gain information as to the cheapest methods of producing beef and pork.

The fruit crop during the past year has been very encouraging. One of the small orchards planted with varieties of the Siberian crab bore fruit abundantly, the trees being weighed down with their load. There was also a good crop of plums of different sorts, chiefly seedlings, many of them of fair quality. These crops awakened much interest among visiting farmers as these were the first crops of consequence ever produced of these fruits in the Territories. The crab apples were found to be excellent for jelly and the plums for preserving. The portion of this crop offered for sale brought good prices.

The experiments in the forestry branch have been enlarged and now all the roads on the Farm are planted with avenues or shelter belts of trees, and larger groups and clumps are scattered here and there over the Farm affording protection to buildings, garden and fruit crops, also for cattle, and to some extent for field crops. A large number of young trees have been grown here under my instruction to assist the forestry experiments undertaken by the Department of the Interior.

Many packages of young trees and shrubs, tree seeds, grass seeds and samples of seed grain and potatoes have been sent out for trial during the past year to farmers in all parts of the Territories.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA.

The trials made at this Farm during the past year with a large number of promising varieties of oats, wheat, barley, pease, Indian corn, field roots and potatoes, to

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gain information as to those best suited to the climate of British Columbia, have been very successful, and the returns most encouraging. While the spring was cold and backward the rainfall was not too heavy for farm crops, and towards the end of June and through July and August the weather at the Experimental Farm was very favourable for the growing grain, fodder crops and roots, and in most instances excellent returns have been realized. The potatoes have given an extraordinary yield. Experiments have also been conducted with wheat, oats and barley, using different quantities of seed per acre so that information might be gained as to the quantity most likely to produce the best results. Also with seed gathered from selected heads of these cereals compared with well screened seed from ordinary field crops.

Tests have been made with artificial fertilizers on some of the more important field crops.

A shipment of pure bred Shorthorn cattle was made to this Farm during the past season, consisting of fourteen heifers and one bull. Six of these were sold at Victoria, at the sale of the British Columbia Dairymen's Association. The remainder have been reserved at the Farm for breeding purposes. The sheep, pigs and poultry are all reported on as doing well.

While most of the varieties of small fruits yielded well, the larger fruits gave in most cases poor crops. As the trees blossomed well, this partial failure was no doubt mainly due to the very wet weather which prevailed during the blossoming period which prevented much of the fruit from setting. There were, however, many trees bearing fruit and among them a considerable number of new sorts which had not fruited here before. Descriptions of the character and quality of these were taken by the Superintendent, and will be reported on.

The vegetable garden contained a fine assortment of all the leading vegetables. In the annual report much information will be found as to the earliness, productiveness and quality of the different sorts tested.

In the nut orchard the English, Japanese, heart-shaped and American walnuts all fruited, some of them for the first time. As these trees promise well in that climate, the nuts were saved and distributed for planting to farmers and others interested in nut growing in British Columbia.

The plantations of valuable timber trees also of ornamental trees and shrubs are making rapid growth.

ARCHIVES.

The work of this Branch goes on as usual, with the strictest regard to economy and efficiency. The state papers for Lower Canada published in this report, including the years 1836 and 1837, contain the correspondence of the Earl of Gosford, who was sent out as head of the Commission to Investigate Grievances. Those for Upper Canada contain the final correspondence of Sir John Colborne, afterwards Lord Seaton, and the appointment of Sir F. B. Head who succeeded him, with copies of dispatches addressed to him in 1835 and 1836.

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III.—PATENTS OF INVENTION.

The following comparative tables show the transactions of the Patent Branch of the Department of Agriculture, from the calendar year 1891, to the year ending October 31, 1901 :—

Years.	Applications for Patents.	PATENTS AND CERTIFICATES GRANTED.			Caveats.	Assignments of Patents.
		Patents	Certificates.	Total.		
1891.....	3,233	2,343	393	2,736	215	1,231
1892....	3,176	3,417	415	3,832	242	1,500
*1893.....	2,614	3,153	292	3,445	229	1,345
1894.....	3,291	2,756	462	3,218	301	1,445
1895.....	3,387	3,074	422	3,496	343	1,550
1896.....	3,728	3,488	413	3,901	306	1,420
1897.....	4,300	4,013	284	4,297	377	1,551
1898.....	4,200	3,611	262	3,873	363	1,657
1899.....	4,305	3,151	412	3,563	311	1,467
1900.....	4,628	4,522	482	5,004	283	1,914
1901.....	4,817	4,766	551	5,317	302	2,323

* For 10 months only.

DETAILED STATEMENT, Patent Office Fees.

Years.	Patents.	Assign- ments.	Caveats.	Copies.	Subscription to <i>Patent Record.</i>	Notices to Apply for Patent.	Sundries.	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
1891.....	72,664 26	2,411 95	1,124 60	782 29	.....	.....	340 53	77,723 63
1892.....	71,840 84	2,794 66	1,270 13	793 32	236 52	89 96	195 33	77,216 76
*1893.....	58,441 81	2,633 71	1,244 70	796 15	285 18	337 81	110 73	63,850 19
1894.....	73,061 77	3,142 74	1,793 40	764 07	347 21	1,449 80	123 57	80,682 56
1895.....	78,223 52	3,194 00	1,854 35	761 54	245 98	1,951 30	129 79	86,358 48
1896.....	85,060 61	3,130 56	1,790 65	898 27	420 60	2,245 79	57 04	93,532 52
1897.....	93,298 16	3,250 23	2,108 57	969 33	252 53	2,110 89	128 21	102,117 92
1898.....	91,176 44	3,641 00	1,935 74	706 50	266 44	1,463 10	172 73	99,361 95
1899.....	98,669 92	3,781 71	1,533 25	1,028 80	198 05	1,912 00	137 83	107,261 56
1900.....	104,848 96	4,255 40	1,405 00	932 54	552 71	1,742 70	115 15	113,852 46
1901.....	109,985 59	4,506 07	1,479 25	882 87	592 47	2,484 90	133 22	120,064 37

* For 10 months only.

The Patent Office fees received during the year ended October 31, show a surplus of \$69,211.38 over the working expenses of the office as per subjoined table.

Receipts.		Expenditure.	
	\$ cts.		\$ cts.
Cash received.....	120,064 37	Salaries.....	33,918 41
Cash refunded.....	2,039 70	<i>Patent Record</i>	14,894 88
			48,813 29
		Receipts over expenditure.....	69,211 38
Net cash.....	118,024 67		118,024 67

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The following is a table of the countries of residence of the patentees for the years named :—

Countries.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.
Canada.....	606	671	685	661	707	740	756	710	601	707	741
England.....	122	298	206	177	179	215	266	261	205	254	256
United States. . .	1,519	2,227	2,061	1,731	1,980	2,270	2,666	2,312	2,038	3,216	3,423
France.....	10	26	24	24	21	24	26	39	36	40	50
Germany.....	36	106	88	108	102	117	126	124	112	157	125
Other countries	50	89	89	55	85	122	173	165	159	148	168
Total	2,343	3,417	*3,153	2,756	3,074	3,488	4,013	3,611	3,151	4,522	4,766

* For 10 months only.

The Canadian patentees were distributed among the provinces of the Dominion as follows :—

Provinces.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.
Ontario.....	394	464	437	404	451	430	464	383	310	396	407
Quebec.....	140	131	151	162	177	201	178	171	140	164	185
New Brunswick.....	16	19	23	13	13	12	20	26	7	14	26
Nova Scotia. . .	22	16	29	15	19	32	22	27	18	21	17
Prince Edward Island..	1	1	3	2	6	2	2	4	8	1	0
Manitoba and the North-west Territories	28	22	26	38	18	28	36	45	50	42	52
British Columbia.....	5	18	16	27	23	35	34	54	48	69	57
Total	606	671	*685	661	707	740	756	710	601	707	744

* For 10 months only.

Statement of the number of Patents issued under the Act of the session of 1892, 55-56 Vic., chap. 24, on which the fees are paid for periods of six, twelve or eighteen years, at the option of the patentee ; and of Patents on which certificates of payments of fees were attached after the issue of Patents originally granted for periods of five and ten years.

Years.	Periods for which the Fees were paid on first issue.			Patents on which Certificates were attached after issue.			
	6 yrs.	12 yrs.	18 yrs.	6 yrs.	12 yrs.	5 yrs.	10 yrs.
1892 (Six months ended December 31). . .	2,141	3	35	.. .	3	387	25
1893 (Ten months ended October 31).....	3,098	9	46	.. .	3	279	10
1894 (Twelve months ended October 31)....	2,701	9	46	.. .	4	433	25
1895	3,049	5	20	.....	.....	416	6
1896	3,443	11	34	2	.....	401	10
1897	3,981	8	24	15	3	262	4
1898	3,586	3	22	176	9	77	0
1899	3,125	3	23	291	13	108	0
1900	4,489	4	29	366	21	101	0
1901	4,719	8	39	408	31	112	0

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It will be found in the preceding tables that the total revenue for the year was \$120,064.37, being the largest in the history of this branch of the Department, resulting in an increase of \$6,211.91 over the preceding year and a surplus of \$69,211.38 over the expenditure.

As in previous years, the larger proportion of applications for patents came from inventors resident in the United States, to whom were granted 3,423, over 71 per centum of the whole issue.

The number of petitions under section 37 of The Patent Act, in which satisfactory reasons were shown to justify the granting of the importing privilege, was 1,604, and of the manufacturing privilege, 2,340.

The total number of reports issued by the examiners during the year was 6,395.

The Office has again to remind applicants that great care should be taken in the preparation of the papers which are required by the rules and forms, and unless competent to prepare them, they should employ a skilled attorney, as the value of patents is largely based upon the ability with which the specification and claims have been prepared.

There has been a slight increase in the number of foreign patentees, who, under section 8 of the Patent Act, gave the Commissioner notice of their intention to apply for patents in Canada, 1,119 of these notices having been registered during the year, yielding a revenue of \$2,484.90.

The Canadian Patent Office Record, published in monthly numbers, is found to be of great and increasing value to all who are interested in patents. It affords convenient and easy reference to the claims and diagrams of all patents granted in Canada, as well as containing a list of registered copyrights, trade marks and designs. The Office gratuitously furnishes copies of this publication to a large number of free libraries in Canada and in foreign countries, with the object of diffusing in the public interest the information therein contained. The revenue derived from private subscription during the past year amounted to \$592.47.

The work of the much needed classification of Canadian patents is progressing favourably, and as an outcome of this compilation, the Office will be able at an early date to publish a complete and general index of inventions of all patents granted to the present year. This will prove a valuable index to solicitors of patents, manufacturers and those interested in patents, for the reason that there will be a complete uniformity throughout, which is almost impossible to expect in indexes compiled year by year, and by different persons.

A further addition has been made to the Patent Office Library, by the purchase of 400 volumes of scientific works, intended mainly for the use of the examiners in the discharge of their duties.

The attention of patentees and their solicitors is again called to the necessity of remitting partial fees before the expiry of the six and twelve years' terms, otherwise the patents will cease and determine, the Commissioner not being vested with the discretionary power, under any circumstances, to revive them. A revival can only be

secured by a private Act of Parliament, the obtaining of which entails considerable expense to the patentee. It may further be added that the committee on private Bills usually discourages applications of this kind on the ground that no one should be denied the right of using or vending an invention which has fallen into the public domain ; exceptional cases may arise, however, in which the patentee or the holder of the patent may be justly entitled to relief from parliament.

IV.—COPYRIGHTS, TRADE MARKS, INDUSTRIAL DESIGNS AND TIMBER MARKS.

STATEMENT of fees received by the Copyright and Trade Mark Branch, from November 1, 1900, to October 31, 1901.

Months.	Trade Marks.	Copy- rights.	Designs.	Timber Marks.	Assign- ments.	Copies.	Total.
1900.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
November..	861 75	88 50	25 00	14 00	35 00	4 00	1,028 25
December.....	1,159 25	112 50	55 00	2 00	47 00	9 50	1,385 25
1901.							
January .	850 25	76 50	35 00	2 00	16 25	10 50	990 50
February ..	1,091 00	74 00	50 00	8 00	21 00	17 50	1,261 50
March	2,161 25	87 50	93 00	.....	24 00	8 50	2,374 25
April.....	1,355 25	112 50	74 00	2 00	35 10	7 00	1,585 85
May .	1,516 10	85 00	173 00	.....	26 00	10 00	1,810 10
June. .	949 73	115 50	62 00	2 00	16 00	15 00	1,160 23
July.....	1,364 92	73 50	64 00	.....	42 76	19 50	1,564 68
August.....	1,050 25	88 00	45 00	8 00	21 25	.....	1,212 50
September.....	791 00	99 00	25 00	4 00	21 00	6 00	946 00
October.....	1,289 00	101 00	30 00	6 00	48 00	30 15	1,504 15
	14,439 75	1,113 50	731 00	48 00	353 36	137 65	16,823 26

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The following table shows a comparative statement of the business of this Branch from 1891 to October 31, 1901, inclusive :—

Year.	Letters Received.	Letters Sent.	Copyrights Registered.	Certificates of Copy-rights.	Trade Marks Registered.	Certificates of Trade Marks.	Industrial Designs Registered.	Certificates of Industrial Designs.	Timber Marks Registered.	Certificates of Timber Marks.	Assignments Registered.	Fees Received.
												\$ cts.
1891.....	1,651	2,385	541	174	307	307	129	129	11	11	51	9,236 96
1892	1,773	2,300	536	159	294	294	30	30	27	27	66	9,496 29
1893.....	1,432	2,070	475	126	257	257	41	41	19	19	55	8,013 33
1894.....	1,882	2,720	546	216	311	311	39	39	20	20	77	9,463 63
1895	2,184	3,279	601	163	374	374	52	52	20	20	70	11,673 26
1896.....	2,185	3,437	653	212	331	331	68	68	14	14	161	10,579 54
1897.....	2,606	3,548	756	273	446	446	75	75	13	13	94	14,101 93
1898.....	2,576	3,453	734	275	423	423	136	136	15	15	114	13,535 17
1899... . .	2,487	2,910	702	237	430	430	112	112	5	5	117	14,161 28
1900.... .	2,679	3,213	893	247	447	447	126	126	22	22	136	14,782 53
1901.....	2,605	3,211	888	249	521	521	146	146	24	24	183	16,823 26

The total number of registrations of copyrights, trade marks, industrial designs and timber marks, including registrations of assignments, was 1,762 during the year ended October 31, 1901. This consisted of 830 registrations of copyrights, 521 registrations of trade marks, 146 of industrial designs and 24 of timber marks. There were also issued 226 certificates of copyrights, 58 registrations of interim copyrights, and 23 certificates, 18 registrations of temporary copyrights, and 2 certificates. The total number of assignments of these different rights recorded was 183.

The correspondence of this branch of the department amounted to 2,605 letters received ; 3,211 letters sent.

The amount of fees received during the year, as certified by the accountant, amounted to \$16,823.26.

V.—PUBLIC HEALTH AND QUARANTINE.

The year has been especially marked by the continued threatening of the bubonic plague and small-pox on both our coasts and along our frontier.

The Bubonic Plague.—The places of the occurrence of this disease have been numerous and widespread. It has raged in China and in India. It has prevailed in Russia in the districts of Astrakhan and Uralsk, and in Vladivostok; in Constantinople, Smyrna, Singapore, Manilla, Hong Kong, Formosa, Japan, Honolulu, Austra-

lia, New Zealand, Brazil, Egypt, Cape Colony, Naples, Reunion and Mauritius. It has been brought to the ports of Southampton, Cardiff, Hull and Shields, to Durban in South Africa, and to San Diego in California. Within the last day or two three cases in Liverpool and four in Glasgow are reported to have occurred. In San Francisco it has been present throughout the year in the Chinatown of that city; fatal cases having been reported in almost each month, and making a total since its first appearance in March of last year of 45 cases and 41 deaths.

Small-pox.—Small-pox has come to my Quarantine Stations on both the Atlantic and Pacific coasts, but in each such instance the outbreak has been limited to and stamped out at the Quarantine Station. It has also prevailed extensively in the United States throughout the year. The public health reports published officially at Washington give the total of cases actually reported in the six months from January 1 to June 30, this year, as 30,710.

In the fourteen states bordering on Canada, from Alaska to Maine, inclusive, there are at present 8,728 reported cases.

Additional Precautionary Measures.—This threatening, both of the bubonic plague and small-pox, has necessitated the maintenance of frontier medical inspectors and guards at those of my unorganized Quarantine Stations where it has seemed the most serious from time to time. Especially has this been necessary on the railway crossings and trails where the public health organizations of the states bordering on any portion of our southern frontier have proved inadequate to successfully control the outbreaks of the disease.

For similar reasons my orders under section 9 of the Quarantine Regulations—excepting from those regulations vessels from San Francisco and ports north of it on the one ocean, and from New York and ports north of it on the other,—have been withdrawn.

Increased Public Health Staff.—These necessary measures have increased the staff of my public health service to close on forty medical officers, under my Director-General of Public Health.

Public Health Administration of the Territories.—In April last the public health administration of the North-west Territories and of the Yukon Territory was transferred to me by the Minister of the Interior. I thereupon sent Dr. James Patterson from Winnipeg to the Edmonton district to report upon and deal with the small-pox there. Subsequently I sent him to Regina to look after, from there as a centre, the various outbreaks of this disease in the Territories, and to work in harmony with the North-west government and in accordance with the provisions of the Territorial Health Ordinance. Dr. Patterson performed his onerous duties to my entire satisfaction.

National Bacteriological Laboratory.—Canada should be equipped with a national bacteriological laboratory as is the case in other countries. Such a laboratory could report promptly on suspected specimens of micro-organisms from vessels, trains, &c., held under quarantine of observation. The quality and purity of the various protective and curative agents, such as vaccine, tuberculin, Haffkine's prophylactic plague fluid, and the anti-toxins and serums of diphtheria, cholera, plague, typhoid, anthrax,

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&c., are of the utmost importance to the public health and to the well-being of the country. Their manufacture might, therefore, be controlled by the government and not left in the hands of private interests as a commercial enterprise. They might be prepared by salaried officials in a national laboratory, and issued under the supervision and control of the government.

In this way the maximum protection of the people of Canada in this matter can alone be obtained, and that confidence secured which will induce the people to properly avail themselves of these all-important means of protection from epidemic disease.

Original Scientific Research.—With such a national laboratory Canada could then take a place, worthy of her great position and destinies, in original research, under governmental control, towards the advancement of science, and the consequent benefit of all mankind.

The Permanent Staff.—Dr. W. H. K. Anderson has been appointed medical assistant at the William Head Quarantine Station, B.C., replacing the officer whom I had temporarily transferred there from his work elsewhere. Dr. W. W. Aylen has been appointed medical assistant at Grosse Isle, Que., vice Dr. F. W. Church who has left the service. These are the only changes in the permanent medical staff during the year.

Details of the Year's Work.—Full details concerning the year's work at my different stations will be found in the reports of my officers annexed as appendices.

TRACADIE LAZARETTO.

Four of the leper inmates of this establishment died during the year. Two new cases were admitted, both from the district of Shippegan. The present number of patients is 18, 11 male and 7 female.

PUBLIC WORKS HEALTH ACT.

I caused to be issued on May 25 of this year a series of regulations by Order in Council, in virtue of the provisions of the Act 62-63 Victoria, chap. 30, intituled 'An Act for the preservation of health on Public Works.' These regulations were established in lieu of those under the previous Order in Council of January 31, 1900. These regulations provide :—

(a) As to the extent and character of the accommodation to be afforded by the houses, tents, or other quarters occupied by the employees on the works ;

(b) for the inspection of such houses, tents or other quarters, and the cleansing, purifying and disinfecting thereof where necessary ;

(c) as to the number of qualified medical men to be employed on the works ;

(d) for the provision of hospitals on the works and as to the number, location and character of such hospitals ;

(e) for the isolation and care of persons suffering from contagious or infectious diseases.

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Mr. Fisher, my inspector under this Act, has made official visits to the various public works covered by section 1 of the Act and coming within the legislative authority of the Parliament of Canada.

He reports to me a general satisfaction with the Act and the enforcement of the public health regulations under it.

VI.—STATISTICS.

The Statistical Division of the Department of Agriculture is based upon the Union Act, which specifically assigns census and statistics to the exclusive authority of the Parliament of Canada.

In accordance with this assignment of duties, the Parliament of Canada passed chap. 21, Acts of 42 Victoria.

In the Revised Statutes of Canada, 1886, this Act forms chapters 58 and 59. Chap. 60 is the authority for the collection of criminal statistics.

As misapprehension seems to exist leading to indiscriminate and unofficial publication of statistics, sections of the Act, chap. 59, R.S.C., are here given :—

The first section provides for the collecting, abstracting, tabulating and publishing of vital, agricultural, commercial, criminal and other statistics by the Department of Agriculture.

The fourth section gives the Minister of Agriculture power to arrange with any Lieutenant-Governor in Council, or with any provincial organization, for the collection and transmission of information collected under provincial systems.

The fifth section says :—

‘The Minister of Agriculture may, in collecting statistics in the manner provided by this Act, call upon any and all public officers to furnish copies of papers and documents and such information as lie respectively in the power of such officers to furnish, with or without compensation for so doing, as is regulated, from time to time, by the Governor in Council.’

The sixth section provides for the publication of an abstract and record of the various departmental or other public reports and documents.

The seventh section gives power to the Governor in Council to authorize the Minister of Agriculture to cause special statistical investigations as regards subjects, localities or otherwise to be made.

The eighth section empowers the Minister of Agriculture to cause all statistical information obtained to be examined, and any omissions, defects or inaccuracies discernible therein to be supplemented and corrected as far as possible.

The ninth section is as follows :—

‘Every one who wilfully gives false information or practises any deception in furnishing information provided for by this Act shall on summary conviction before two justices of the peace, be liable to a penalty not exceeding one hundred dollars.’

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By another section in the Act, the Governor in Council is empowered to appoint temporary clerks or employees for an indefinite period.

The evident aim and intention of these several Acts is the establishment of a Bureau of Statistics which shall form part of the Department of Agriculture, and in which shall be consolidated the general statistics of the country, the officers in charge of which shall have every facility necessary to enable them to obtain the needed statistics from the several departments of the federal government, of the provincial governments, or by special statistical investigations.

A general collection and issue of Dominion government statistics by the Statistical Division, as directed by the statute, would establish uniformity, coupled with increased accuracy and large economy in compilation.

The public appear to appreciate the efforts of this division of the Department of Agriculture, the preparation of general statistics in answer to inquiries being each year greatly in excess of the previous year ; the aim is to give all inquirers the best information obtainable. The Statistician's office has become a generally inquiry office for all parts of the world.

In the course of these inquiries the Statistician has been forced to confess the fact that Canada lags behind other countries in many branches of statistics.

In no branch have there been so many inquiries as to that relating to agricultural statistics. These inquiries have necessarily been answered in a most unsatisfactory way, owing to the absence of any system of collecting agricultural statistics co-extensive with the Dominion. If a good plan, ensuring accuracy and early publication, could be adopted in Canada, the value to farmers and business men of this information can hardly be over-estimated.

HEALTH STATISTICS.

No steps have been taken as yet to provide a better system of collecting vital statistics than that which was abolished in 1891.

In the provinces of Ontario, Quebec, New Brunswick, British Columbia, Manitoba and the North-west Territories, the provincial and territorial authorities have placed on the statute-books Acts dealing with the collection of vital statistics. Section 4 of chap. 59, Revised Statutes, already quoted, gives the necessary legislative authority to enable my department to join the provincial authorities in making arrangements for the better collection of different kinds of statistics, without limiting the power of my Department to enter upon provincial fields not worked by provincial organizations. By a combination of forces the result would be more satisfactory than by any other system that could be originated by the federal authorities. Instead of clashing statistics there would be statistics having a joint approval.

This plan could be carried out in respect to agricultural statistics ; so that while each province could have its own statistics for publication, the world at large would have those of the Dominion. The very great attention given to crop statistics in the

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United Kingdom, United States, France, Germany and Australia, and the large monetary operations based upon them, make it almost imperative upon Canada to provide her farmers and business men with these aids to successful efforts.

CRIMINAL STATISTICS.

The special analysis of these statistics which has usually accompanied the general report of the Department has been transferred this year to the preliminary pages of the blue-book giving the compilation of the criminal records.

1. It is only necessary, therefore, to mention a few of the salient points.

The number of convictions in 1900 was 10·72 per 10,000 inhabitants—which is practically the same as in 1899. British Columbia is above the average, having 26·40 convictions in every 10,000 of its people. The Territories come next with 18·49 convictions in every 10,000 of the people living there. Ontario is third with 12·01 convictions ; Manitoba fourth with 11·37 ; Quebec fifth with 9·18 ; Nova Scotia sixth with 7·07, and New Brunswick and Prince Edward Island seventh and eighth with 4·26 and 2·48, respectively.

2. The proportion of females among the criminal class has constantly decreased. During 1884-91 it was 8·6 per cent. During 1892-1899 it was 6·7 per cent and in 1900, it was 5·8 per cent.

3. The records show a tendency towards a habitually criminal class. The individuals are fewer ; each has more crimes to his record.

4. Taking numbers the serious crime of the country is located in the class 'Offences Against Property Without Violence,' in which class 63 per cent of the indictable offences fall.

5. Juvenile delinquency showed a tendency to diminish during 1900. During previous years the number of youthful criminals showed a steady increase.

THE STATISTICAL YEAR-BOOK.

The work is published by my Department under authority of chap. 59, sec. 6, Revised Statutes of Canada.

The demands for the work increase every year. Requests for the 1900 edition from the governments, public libraries and chambers of commerce of France, Germany, the United States, Italy, Japan and other foreign countries have been received, while the number required for the United Kingdom and other portions of the British Empire has been larger than ever.

An increasing number of lengthy notices, abstracts and resumes of the Year-book is noticeable in the newspapers of Great Britain, the United States, France, Germany, Japan and other countries.

The demand within Canada continues to increase every year.

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There is a great demand for back numbers to make up full sets. As a result, the editions of 1893, 1894, 1895, 1896 and 1898 in English are completely exhausted.

The Year-book in French has been increasingly in demand. Of the earlier years there is a good number in stock. Of later years, 1891-98, there remain very few copies, and of 1891, 1893, 1894 and 1895 none at all.

The demand of late years for the French version is the most satisfactory fact in the history of the Year-Book. •

There has been a very considerable demand for other publications of the Statistical Division. The Glasgow and Pan-American Exhibitions were supplied with a Handbook on Canada and a pamphlet on Pulpwood and Wood Pulp, which were in great demand.

During the year the letters, circulars and statements sent out from the office numbered 7,861, and those received 8,553.

The whole respectfully submitted,

SYDNEY A. FISHER,
Minister of Agriculture.

APPENDICES

QUARANTINE AND PUBLIC HEALTH

No. 1.

REPORT OF THE DIRECTOR-GENERAL OF PUBLIC HEALTH.

(F. MONTIZAMBERT, M.D. Edin., F.R.S.C., D.C.L.)

October 31, 1901.

SIR,—I have the honour to submit this my annual report as Director-General of Public Health, to October 31, 1901.

Amongst the graver epidemic diseases which have threatened Canada this year, on both coasts and along our inland frontiers, the bubonic plague and small-pox have continued to hold their evil pre-eminence.

Bubonic Plague.—In San Francisco, at the date of my last report a year ago, there had been nineteen cases of plague reported, with seventeen deaths. At that date, October 31 and November 1, three more deaths were reported. One of them was a white woman, a professional nurse, who had been attending a case reported as ‘nasal diphtheria.’ From that date there were not any cases publicly reported until January when two fatal cases occurred, and they have been followed by six in February, one in March, two in April, four in July, one in August, all fatal. Last month six cases were reported, four of which were fatal. One fatal case was reported on the 10th of this month. So that in Chinatown, San Francisco, there have been reported so far this year twenty-three cases and twenty-one deaths. And since the first reported case in March of last year, forty-five cases and forty-one deaths. All these cases seem to have been of the bubonic type ; none of them of the pneumonic.

In January last, a special commission was appointed by the government of the United States for the purpose of ascertaining the existence or non-existence of bubonic plague in San Francisco. *Public Health*, a journal of sanitation, published in Philadelphia, reports as follows on the work of this commission :—

The Commissioners, Drs. L. F. Baker, University of Chicago ; E. C. Novy, University of Michigan, and Simon Flexner, University of Pennsylvania, met in San Francisco, January 27, and proceeded at once to acquaint themselves with the local sanitary situation.

This involved a thorough study of Chinatown, which comprises fourteen blocks in the heart of the city, contiguous to the business portion and the newer residence portion. Trolley cars pass constantly, and a lively pedestrian traffic continues all day and late at night. There is a mingling of the races to a greater extent than usual in cities. The dwellings of the poorer classes of Chinese are shockingly unsanitary, small rooms, much over-crowding, ventilation poor, insufficiently lighted, and generally filthy. Often these conditions prevail to a very great extent even in the more pretentious business buildings. The Chinese in this city are well fed, wages are high, food abundant and cheap. They wear shoes, stockings and trousers, a fact to remember, as it is believed by many that the bare legs and feet had much to do with the infection of the plague here.

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Much difficulty was experienced in obtaining information owing to the secretive habits of these people. Again, they will not consent, if they can avoid it, to touch a body, nor to secrete one in their homes. They have a 'hall of tranquillity' to which the sick are transferred by their friends, where they are often left to die. Thirteen dead Chinese were inspected, six were proven to have died of plague. This was shown by post-mortem and bacteriological study. This work was done in the most careful and scientific manner. Each case was studied completely. The bacillus was identified in each instance. This bacillus is characteristic and not liable to confusion with other germs. The effects of animal inoculation are unmistakable.

A number of the cases met with were obviously instances of advanced tuberculosis; others were affected with various chronic diseases, such cases being of no interest for the investigation were visited only once. When patients were found who presented symptoms which were suggestive of plague, a careful examination was made; in doubtful cases, the first visit was followed by others and the progress of the illness carefully watched. These regular visits of daily inspection were maintained until February 16, 1901, during which period a sufficient number of instances had been observed to permit the commissioners to conclude beyond possible doubt that cases of bubonic plague were occurring among the Chinese.

Referring to this *The Journal of the American Medical Association* asks:

How are we to explain the fact that the disease has not spread more rapidly? There has certainly been no great outbreak and the disease itself has not occurred in violent enough form to excite any great alarm in the district in which it is occurring. The explanation is not easy, but several significant facts may be mentioned. The climate is not favourable to the spread of plague; there is but little poverty in San Francisco; even among the Chinese there is an absence of the marked destitution to be met with in native cities in China; in California the Chinese are clothed, while in China and in India it is said that the people among whom the disease spreads go bare-footed and usually bare-legged, some of them wearing nothing but a breech-clout. It is possible too that owing to factors with which we are as yet unacquainted, the rats in San Francisco have not become infected; our correspondents state that there has been no evidence as yet of an epidemic among the rats in the city, and, as is well known, practically every great epidemic among human beings has been preceded by an epidemic among rats of the place. We might think of the possibility of a low-grade of virulence among the bacilli which are at work in San Francisco, an excusable hypothesis in view of the fact that fulminating cases do not seem to have occurred and that in many of the fatal ones the illness lasted for two or three weeks. The experience is not peculiar to San Francisco, however; precisely the same kind of sneaking epidemic occurred in Calcutta for two years or more before the big outbreak and a similar history attaches to various other places.

At Ann Arbor, Michigan, U.S., a student contracted the bubonic plague, it is reported by infection from its bacillus with which he was working in the laboratory. He was kept isolated, and no further cases occurred there.

Plague has prevailed throughout the year in China and in India. It has occurred in Russia, in the districts of Astrakhan and Uralsk, and in Vladivostock. In Constantinople, Smyrna, Singapore, Manilla, Hong Kong, Formosa, Japan, Honolulu, Australia, New Zealand, Brazil, Egypt, Cape Town, Reunion, Mauritius, Naples and Rio Janiero. It has been brought to the British ports of Southampton, Cardiff, Hull and Shields, to Durban, in South Africa, and to San Diego, in Southern California. Within the last day or two three cases in Liverpool and four in Glasgow are reported to have occurred. It is again present at Rio; it is also reported at Batoum, and a fresh case in Australia, October 10, the first for two months.

The report on the epidemic of bubonic plague in Hong Kong during last year has been submitted to the British government by Dr. F. W. Clark, M.O.H. The *British Medical Journal* thus reviews this report:

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The earlier part of the report shows in the following table a comparison of epidemics in 1894-96-98-99 and 1900 :—

	1894.	1896.	1898.	1899.	1900.
Cases..	2,679	1,204	1,320	1,486	1,082
Deaths.... .	2,485	1,078	1,175	1,428	1,034
Percentage mortality.... .	92·7	89·5	90·0	96·1	95·5

Of the 1,082 cases in 1900, 28 were non-Chinese, and of 1,034 deaths, 15 were non-Chinese. The Chinese case-mortality was very high (96 per cent), while the non-Chinese mortality was only 53·6 per cent. Among the non-Chinese fatal cases there was only one Epourean.

A 'Britisher employed at the naval yard who had only arrived in the colony from England six weeks previously. It has been observed before in this colony that new arrivals from temperate climates are far more liable to contract the disease and to succumb than are residents of some standing.'

Taking the Chinese cases, 720 were males and 334 females, that is, 31·7 per cent were females as compared with 1898, when the percentage was 35·8. The proportion of females in the Chinese population is 29·9 per cent. Chinese children appear to be even more susceptible to bubonic plague than adults, the mortality among them being 96·7 per cent. The greatest number of cases occurred during the second quarter of the year (April-June), there being 746 cases and 683 deaths.

'No fewer than 412 of the cases have been dead bodies found in the streets or floating in the harbour. These bodies are thrown out at night by the other occupants of the infected houses with a view to avoiding the disinfection of the premises, and it would appear to be impossible to put a stop to the practice without an enormous increase in the European police force in the colony. If this practice cannot be successfully dealt with, Dr. Clarke sees no other remedy than for the sanitary board to decide to cremate all dead bodies found in the streets, the harbour, &c.'

The returns show that in the city the average rat mortality above ground is from 400 to 500 a week, but that during an epidemic of bubonic plague as many as 2,000 are to be discovered ; the removal of these from the city is undoubtedly beneficial as removing one important source of infection both to human beings and to healthy rats. Though 400 Chinese coolies have been employed regularly in the scavenging and cleansing of the city, only 3 cases of bubonic plague occurred among them during the year.

An interesting case of infection by the bite of a sick rat occurred during the year.

'A man employed as a turncock, and living in No. 2 Health district, was bitten on the left thumb, and two or three days later the arm became swollen and painful. The case was not reported, and the man died in his home some nine or ten days after he had been bitten. On post-mortem examination two small wounds were found on the ball of the left thumb ; the left hand and forearm were much swollen, and in the left axilla there was a brawny œdematous swelling in the midst of which was a large hæmorrhagic gland ; a smear preparation from this gland showed numerous plague bacilli.'

A clear case of infection by inoculation was the following :—

'I was asked to see by an army medical officer an Indian lad, aged three and a half years. I found an abrasion of the left knee, which had been caused by a fall in the street while at play some two days previously ; the abrasion was covered by a dry scab and surrounded by an inflammatory areola ; the femoral glands in the left groin were enlarged and painful, and there were the other characteristic symptoms of the disease.'

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The chart of bubonic fever and atmospheric temperature shows that, as in former years, the epidemic abates in this colony as soon as the mean atmospheric temperature rises above 80 degrees F. Early in the year the government procured a considerable quantity of Haffkine's prophylactic fluid, but unfortunately it has not been found possible to persuade many of the Chinese to accept protection in this form.

The total cases and deaths reported from Hong Kong up to September 16 for this year, are 1,740 and 639 respectively.

In India during the week ending October 5, the total number of deaths reported from plague was 7,043, and during the previous week 7,279. Most of these deaths were in the Bombay Presidency.

According to a telegram, dated Cairo, October 21, the total number of cases in all Egypt on that date was 5. Of this number, 2 (Europeans) were reported from Alexandria, and 3 (1 European and 2 natives) at Mit Ghamr. Since the outbreak of April 7 of this year, 152 cases of plague have been reported in Egypt, of which 88 terminated fatally, 89 have been cured, and 5 remain under treatment.

In the colony of Cape Town, Cape of Good Hope, the total cases to August 26 were 801, with 386 deaths. Of these 203 cases 68 deaths are reported to have been Europeans. Commenting on the sanitary state of Cape Town the *British Medical Journal* observes :

It is difficult for one dwelling in the British Isles to grasp fully what the sanitary, or rather the insanitary, environment of a 'native' city means. Moreover, many Europeans, living for years in a city surrounded by native dwellings, are often, in fact usually, totally ignorant of the over-crowded, poverty-stricken, and filthy dens in which the lower classes of natives, it may be only a short distance off, live ; and it is only when the remorseless teaching of an epidemic causes inquiry to be made that the true state of affairs is disclosed. This condition of affairs now prevails at Cape Town, and the reports we have read of the astonishment of the Governor during his visit to the slums are readily understood. In the older parts of Cape Town the streets are wide, and the houses built by old Dutch settlers are substantial, but alongside of these come the more recently-erected hovels of the native, frequently ranged in alleys and closes, actually reeking with filth and foul odours. Ill-paved, ill-drained, narrow, and sunless, these uninviting streets and overcrowded houses give shelter to natives hovering on the verge of starvation. If plague searched for a home, not even in Bombay or Canton could it find a more congenial environment than in Cape Town. In this cosmopolitan city, people of many races congregate. Indians, Malays and Chinese represent the chief coloured foreigners at work in the city, and Zulus, Fingoes and Kaffirs constitute the aborigines of the place. By every other coloured race, and by low-class Europeans, such as Polacks and other Russian immigrants, the aborigines are oppressed and robbed. The Kaffir, Zulu, or Fingo comes to Cape Town to labour at the docks or on the railway or other public works ; he leaves his wife and family behind him in his native kraal up-country, and whilst in Cape Town cares but little how he lives, provided he can save money to take home. It is this class of man that falls into the hands of the Polacks and Russian Jew, and it is from the native Kaffir that these land-sharks squeeze out their livelihood. For a piece of sacking to lie on, and 5 or 6 feet of floor space, the Kaffir has to pay 4d. to 8d. a night, whilst in the little three-roomed houses some thirty or forty men sleep. There is no European quarter distinct from the native dwelling. The hovels of the poor surround not infrequently the better-class houses of the Europeans ; and just as the two races dwell in affinity, so there is a considerable consanguinity, causing occasionally inextricably close relationship of the European and native elements. Half-caste women are chosen as wives by European men, as they find they are content to live in more humble dwellings and in a cheaper way than European women. British domestic servants are a rarity, but, as they prove expensive to keep compared with half-caste women, they are married by the better-off residents only. But the half-caste woman, even with a European husband, affects native friends and ways rather than the more civilized, and there is thereby kept afoot a con-

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stant intimacy between the classes and races which involves an entanglement in social relations and in proximity of dwelling. It is no doubt this jumble of races and places that accounts for so many Europeans being attacked by plague, and it renders clearance of an 'area' well nigh an impossibility, so adjacent are the dwellings of the white and coloured races.

In British South Africa the total cases up to October 13 were 1,664, with 794 deaths. These were divided as follows: In the Cape Colony, 832 cases, with 397 deaths; rate of mortality per cent 47·7; these included 209 cases amongst Europeans with 70 deaths, or 33·5 per cent. In the Cape Peninsula there were 742 and 360 deaths, or 48·5 per cent, including 189 Europeans, with 65 deaths, or 36·6 per cent. In Port Elizabeth 80 cases and 35 deaths, or 43·8 per cent, and in other places 10 cases, with 2 deaths, or 20 per cent, including Europeans, 5, with 1 death, or 20 per cent.

The report of the Department of Public Health of New South Wales on the 'Outbreak of Plague at Sydney, 1900,' is a very interesting document. The fulness of detail, the excellent illustrations, the condign discussion, and the prompt publication speak well for the state of organization of the department and for the energy and ability of the chief medical officer, Dr. J. Ashburton Thompson. The epidemic consisted in the attack with plague of 303 persons between January 19 and August 9, of whom 103 died. Of the multifarious branches of work entailed by the epidemic and adequately set forth in the present report, particular attention may be directed to the efforts to trace the manner of infection and the mode of spread of the disease. It seems to be quite conclusively shown that an epizootic disease among rats preceded the first case which occurred in man, and bacteriologic examination showed that the epizootic disease among the rats was bubonic plague. Further, that the area over which the epizootic extended was practically co-extensive with that over which the plague was observed in man. This epizootic died out at the same time as the epidemic ceased. The general conclusion based upon the evidence thus outlined is that 'The epidemic was caused by communication of the infection from rats to man.' As to the manner of transmission from rats to man, but little is said, as the opportunities for careful investigation of this point were not favourable. In seven of the cases distinct marks of flea-bites were noted, and in two cases smears from the little vesiculo-papular lesion showed bacilli morphologically resembling the *B. pestis*. Fleas from infected rats were also examined, and in one the presence of plague bacilli was demonstrated definitely by means of inoculation into a guinea-pig. Should it eventually be established to general satisfaction that plague is communicated to man by means of fleas then it would seem from analogy that there is nothing inherently unreasonable in the theory of a bacterial origin of yellow fever although the disease is transmitted by mosquitoes as shown by the brilliant researches of Reed and his associates. From careful consideration of the facts of the Sydney epidemic, it also seems clear that the disease was not 'catching' in the ordinary sense of the word, and further that it was not communicated in any important degree by fomites. Rat-killing was instituted on a large scale; a special rat-catching staff ultimately reported that it had destroyed 38,600, and the grand total killed by authority is 108,308. Of course, private persons killed a great number also. It is urged strongly that removal of all conditions favouring harbourage and breeding of rats in and near occupied premises be recognized and instituted as an important practical means of protection against epidemic plague. This means steady and faithful carrying out of certain well-known details of municipal sanitation, and specific recommendations are made to meet the local conditions in Sydney based upon the principle that plague is diffused by rats.

He proves, as conclusively as anything can be proved by circumstantial evidence, that the disease reached Sydney through rats brought by vessels from Noumea, where plague was known to exist. The facts, which are carefully worked out in his paper, appear to show that some connecting link between rats and man is wanting, and that the hypothesis that the infection was conveyed by a suctorial insect infesting the rat and transferable to man would not fit the facts very well.

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The destruction of rats is going on in all the larger cities of Japan. In Osaka the local sanitary association has supplemented the efforts of the government, which pays 5 sen (2½ cents) for each rat destroyed, by issuing to those receiving this reward a sort of lottery ticket, which will, perhaps, after a time, entitle the holder to a considerable prize. The results of this measure are marked, as it is reported that, since April 1, 50,000 rats have been killed in Osaka alone. The health authorities in Tokio, in their efforts to suppress the plague, have offered a bounty for the killing of rats in the infected district, with the result that over two hundred thousand of the rodents were destroyed in the course of two weeks in June. As an additional measure, infected buildings covering nearly half an acre were burned.

Hankin, in 1897, in India killed rats and mice by inoculating them with the excreta of ants (*Monomorium vaslator*) which had previously devoured rats dead of plague.

Otaga discovered the bacilli of plague in fleas caught upon rats which had died of plague, and is of opinion that such fleas may convey infection by their bites.

The German plague commission in 1897 proved, by inoculating the contents of fleas taken from rats dead of the plague into a guinea-pig, that these fleas contained virulent bacilli.

Simond found that fleas taken from rats and transferred to human subjects proceed to suck the blood of the latter. This is an important point, as it is denied by many that rat fleas will bite man. He further found bacilli in fleas taken from rats dead of plague, which presented the microscopical appearance of plague bacilli. He therefore, as a result of his investigations, reaches the following conclusion: 'That the different forms of so-called spontaneous plague in man and animals are usually to be attributed to parasites,' and he thinks that this theory explains the prevalence of plague especially in filthy localities.

Nuttall criticises Simond's views as hypothetical and inconclusive, and wisely remarks that more facts and fewer opinions are needed, and that the facts can be gathered only by further experimental research. His own experiments with fleas and bugs were negative.

The question, then, as to the manner in which the plague is conveyed from rat to man cannot as yet be said to have been definitely decided. Flies may, and probably do, transmit the disease, and Simond's parasitic theory of conveyance has many strong points in its favour. This much, however, is undeniably true—that rats are in themselves a danger to the world at large as propagators of the plague, and it would also seem that to them is due the widespread nature of the pestilence and its occurrence in out-of-the-way places.

A year ago Danysz described the bacillus which he had found, and the attempts he had made to exterminate rats by wholesale infection with the organism. Recently Kister and Köttgen have published the account of their work upon this bacillus. The bacillus itself is short, thin, and very motile; it differs from the *B. coli communis* in not producing indol or coagulating milk, and from the *B. pestis* in that it does not show the polar staining so characteristic of this latter organism, and that it produces gas from glucose-containing media. They have confirmed Danysz's results concerning the pathogenicity for rats and mice, and find that after three or four passages through rats the bacillus begins to lose virulence; after ten such passages its virulence has disappeared. The bacillus is without effect upon birds, cats, dogs and guinea-pigs. When a rat is allowed to eat bread soaked in a culture of the bacillus, and placed in a cage containing other rats, upon its death the carcass is eaten by the other rats, who then die with the lesions typical of the disease. The experiments appear to have been made to determine how soon the bacillus ceases to kill when the rats acquire the disease by eating their fellows. When the bacillus was kept in the horseflesh bouillon suggested by Danysz for four weeks the virulence had disappeared, but when grown upon agar at 10° C. or 23° C. the virulence did not disappear for several weeks, but there was a progressive decrease. The lesions produced by the bacillus in rats and

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mice were those of a septicæmia with marked engorgement of the spleen ; the glandular affections produced by the *B. pestis* were absent. The difficulty of its application on a large scale will be to find a method of enhancing and maintaining the virulence of the laboratory cultures.

Apropos to the above the recent experiments by Rosenau on the Danysz virus for the destruction of rats, in the hygienic laboratory of the Marine Hospital Bureau, are less encouraging. The rat, as we now well know, is a special plague victim, unfortunately for us as well as for himself, and he has the peculiar habit of developing the disease and introducing it to mankind. Anything, therefore, that can lessen this possibility is to our advantage; one of the most obvious ways, if practicable, would be to find some disorder that could decimate or extirpate these parasites and would be harmless to man. Such a one appeared to possibly exist in the Danysz culture of what seems, from Rosenau's study, to be the bacillus *typhi murium* of Loeffler, a microbe frankly pathogenic for certain smaller species of the Muridæ, the common house mouse and others. It was naturally inferred, therefore, that it might also have similar effects on the larger species, and Danysz, by a patient cultivation of the organism, claimed he had produced the desideratum. Rosenau's experiments, however, made on caged animals under specially favourable conditions for infection, do not justify those claims. He finds that only the ingestion of large amounts of virus by the rodents is fatal, and smaller quantities are uncertain and often produce an immunity to even extreme doses. The infection has but feeble power of propagating itself from rat to rat, and this being true its efficiency is in a great measure lost. In many respects it acts like a chemical poison, with the advantage that it is harmless in men and domestic animals, so far as known, and with the disadvantage that it produces an immunity.

The experience of Dr. Arthur Krausz does not lead him to the conclusion which has been drawn by Danysz that this bacillus can be used as a means for the wholesale extermination of rats. He made several series of experiments. In the first he fed a rat upon bread soaked in a culture of the bacillus, and then placed it in a cage with 19 healthy rats. The bacillus-fed rat died in eleven days, and by the end of sixteen days 8 had died, but no symptoms of Danysz disease could be seen, nor could the organism be recovered from the cadavers. A second experiment was undertaken in which 19 rats were confined in one part of a cage shut off by a shutter from the other part, which contained one bacillus-fed rat. The latter died in ten days, the last of the 19 died on the twenty-seventh day ; all post-mortem and cultural results were negative. A third experiment was performed on the lines of the first—the bacillus-fed rat was allowed to mix with the healthy ones, but no kind of epidemic was produced, even when the rats were kept short of food and had to eat their dead. The death of the healthy rats Dr. Krausz considers to be due to the fact that rats do not thrive in confinement. He agrees with Danysz that when the bacillus is inoculated into the peritoneal cavity the rats die with the typical lesions, and that the bacillus may be recovered from the cadaver. Despite this pathogenicity when inoculated into the peritoneal cavity no comparison can be drawn between the action of Danysz's bacillus upon rats and that of Loeffler's *B. typhi murium* upon mice. It is evident, however, that we will have to look farther for an efficient ally in our crusade against that objectionable rodent, the rat.

Prophylactic and Curative Serums.—With regard to Haffkine's prophylactic fluid for plague, Major W. B. Bannerman, M.D., Superintendent Plague Research Laboratory, Bombay, states :

Dr. Calmette is reported to have given it as his opinion that a person in the period of incubation for a slight attack of plague would find the disease considerably aggravated if he submitted during this period to a preventive inoculation of Haffkine's vaccine. The case would almost certainly end fatally.

The same opinion is again urged in the third Harben Lecture, lately delivered by Calmette in London, and the advice given to refrain from inoculating those in direct

contact with a plague case, though the measure is recommended as a means of immunising a population living round a plague centre.

As Haffkine, on the contrary, has all along maintained that inoculation with his vaccine is harmless in the incubation period of plague, and that this method of protection should be pushed with the utmost vigour amongst those immediately in contact with plague cases, it becomes necessary to examine this matter afresh, in the light of the extensive experience gained in India and elsewhere in the use of the plague prophylactic.

Calmette's ideas have been derived from laboratory experiments, for he has had no opportunity of studying the effect of plague vaccination during an epidemic among human beings. In India, on the contrary, hundreds of thousands of persons have been inoculated with Haffkine's plague vaccine, and evidence has been now accumulated with sufficient accuracy to enable one to refute entirely the above suppositions of Calmette.

The remedy which we owe to Haffkine's genius, and which has passed successfully through the ordeal of examination by the Government Plague Commission, would be shorn of half its usefulness if it could not be used with perfect safety in the very presence of plague itself.

But in addition to this the table furnishes interesting evidence in support of another of Haffkine's contentions, namely, that the prophylactic begins to act beneficially after a lapse of twenty-four hours only. This pronouncement he first tentatively gave out after a study of the effect of inoculation in the House of Correction at Byculla, Bombay, in January, 1897 ; and a study of cases where—as at Undhera, for instance—the inoculations were all performed at one time, shows that this opinion is correct. In such cases the incidence of plague in the two groups is easily compared, though the same information may be equally derived from communities where operations are not all performed at one time. In all cases where a plague-stricken community has been divided into halves—one inoculated and the other not—and where accurate observations have been kept, it is found that the difference between the two portions has begun from the day following the operations.

Yersin's anti-plague serum was tested in Reunion. The report was made by Dr. G. Merveilleux, principal medical officer of the colony, and head of the sanitary service. Towards the end of November, 1900, an unusual mortality was noticed among rodents. The first undoubted case of plague in man occurred on December 1, but doubtful cases had been observed on November 19 and November 29 ; the last case was notified on February 13, 1901, and on February 20 occurred the last death. In all 67 cases were observed, of which number 53 occurred at the port, where two areas became infected. There were 29 cases in December, the same number in January, and 7 in February. The majority of the persons attacked were Creoles, 48 altogether, of whom 31 died ; 13 Indians were attacked, and 9 died ; 4 Malagassees, 1 Chinaman, and 1 Kaffir were also attacked, and all died. Of the 53 cases observed at the port, 35 were of the bubonic form, and 6 of the pneumonic form, but 4 of the bubonic cases were complicated by pulmonary symptoms, and the general mortality there was 71·69 per cent. Yersin's serum was used either by hypodermic or intravenous injection in 15 out of the 53 cases at the port ; 9 of these so treated recovered, a death-rate of 40 per cent, whereas of the 38 not so treated 32 died, a death-rate of 84·21 per cent. Of the 6 cases treated by Yersin's serum, one, a case of plague pneumonia, had been ill for more than twenty-four hours, and died fourteen hours after the injection ; another, suffering from multiple complications, had been ill for more than forty-eight hours, and died one hour after the injection ; in a third the treatment was stopped, but the patient survived ten days after the last injection ; in a fourth case the patient had been ill for more than three days, and died thirty hours after the injection. Dr. Merveilleux therefore points out that in only two cases treated with the serum under favourable conditions did death ensue ; in one of these death appears to have been due to the toxin, for a search for the bacilli after death resulted in the discovery of only a few organisms ; in the other, when the inoculation was begun on the third day, cardiac

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complications already existed, and death ensued thirteen hours after the injection. In this case also very few bacilli could be found.

A. Lustig, professor of pathology, Royal University, Florence, and G. Gabotti, professor of pathology, Royal University, Cagliari, claim good results from a curative serum and a prophylactic prepared by their methods. Of their prophylactic they say :

According to our method this is based on the following principle; to inoculate, as a preventive medium, the substance which is alone able to cause in the organism treated an active immunity produced by the action of a specific bactericidal power. This we obtained by isolating from the microbes the nucleo-proteid of which they are partly composed, for it is to this that immunity is due, although it can be also produced by injecting entire cultures of plague microbes.

And of their curative serum:

As the above-mentioned nucleo-proteid is the only substance capable of determining a specific bactericidal power in animals treated, we use the serum of such animals (after a sufficient treatment) as a curative medium. The question of the existence of specific extracellular toxins produced by the plague microbes is still very much debated. The question of the antitoxic capacity of the serum is even more uncertain, as nobody has yet succeeded in obtaining an antitoxic serum by means of the injection of filtered cultures deprived also of those toxic elements which constitute the protoplasm of the bacterial cells.

Through the injection of this nucleo-proteid, which is an intracellular specific poison, we confer on the serum of the animals treated with it a bactericidal power, and very likely an antitoxic one against the same. Balfour's assertion that 'a horse treated with a nucleo-proteid extracted from the dead microbes would be immunised with even less efficiency than one treated with the killed microbes together with their metabolic products' is theoretically unfounded, and as it does not spring from any principle of experience and practically is not true, for the results obtained from our serum are far better than those given by other serums experimented in India.

Viability of the Plague Bacillus.—In his 'Preliminary Note on the Viability of the Plague Bacillus,' published as a bulletin of the Hygienic Laboratory of the Marine-Hospital service P.A. Surgeon M. J. Rosenau gave the result of his observations on the viability of the plague bacillus on various fabrics and substances and under varying conditions of temperature and exposure to light, presence of moisture, &c. He arrived at the conclusion that the prolonged existence of the organism was dependent upon the presence of moisture more than upon any other one factor. He showed, for instance, that at room temperature (20 to 27 C.) the organism lived in the presence of moisture for 60 days on crash, linen, woollen or silk fabrics; that it lived 96 days in distilled water; 97 days in ordinary tap water, and for the remarkable period of 125 days upon bone dust, where the presence of moisture was assured by wetting the substance with bouillon, and carefully stoppering the container to prevent evaporation. Since the time of publication of the preliminary note, the experiments have been continued in the laboratory for a period of over a year, and have only recently been concluded. Certain food stuffs were experimented on, but the fact developed that symbiosis with saprophytic organisms was prejudicial to the prolonged life of the bacillus, and that the substances must be subjected to a preliminary sterilization, in order to favour the growth of the plague bacillus. On cheese thus prepared, it lived for 13 to 17 days; on sterilized rice for only 3 days; on dried salt beef, 3 days; on orange peel there was no growth; there was no growth on dried figs and raisins, though this was subsequently proved to be due to the amount of grape or fruit sugar contained. In many of the cases of prolonged survival, however, the virulence of the organism was lost at a comparatively early period, 62 days being the longest period after which the organism was fatal to mice. Rosenau also quotes Yokote, of Tokio, as to the effect of the presence of organisms of decomposition on the existence of plague, showing in the case of the bodies of mice dead of plague that the higher the temperature, the more

the decomposition and the greater the number of saprophytes, and that with lower temperatures the reverse obtained.

Dr. Rosenau has published the results of his experiments as 'Bulletin No. 4 of the Hygienic Laboratory':

(1) The bacillus pestis is not a frail organism. It resembles the hæmorrhagic septicæmic group or the cocco-bacilli as far as its viability is concerned.

(2) Temperature is the most important factor in the viability of the plague bacillus. It keeps alive in the cold, under 19 degrees C., a very long time. It dies quickly, especially when dried, at the body temperature, 37 degrees C.

(3) Moisture favours the life of the bacillus pestis. It usually dies in a few days when dry, even in the presence of albuminous matter, provided the temperature is above 30 degrees C. It may keep alive and virulent when dry for months in the cold, under 19 degrees C.

(4) Sunlight kills the organism within a few hours, provided the sun shines directly upon the organism and the temperature in the sun is over 30 degrees C. The effect of sunlight is not very penetrating.

(5) The virulence of the bacillus pestis is often lost before its vegetability.

(6) It is unlikely that new dry merchandise would carry the infection. The organism usually dies in a few days on the surface of objects such as wood, saw-dust, bone, paper, &c.

(7) Clothing and bedding can harbour the infection for a long time and may act as fomites. The bacillus lives for months when dry in albuminous media at temperatures under 20 degrees C.

(8) Food products may carry the infection of plague. The bacillus lives a long time in milk, cheese and butter. It usually dies quickly on the surface of fruits and prepared foods.

(9) The organism may live a long time in water, although plague is not a water-borne disease.

(10) The plague bacillus does not live long on paper, and first-class mail is therefore not apt to convey the infection.

(11) The colder the climate the greater the danger of conveying the infection on fomites—clothing, bedding, food, merchandise, &c.—and more extensive disinfection is required in such a climate in combating the disease than in tropical regions.

(12) The plague bacillus is destroyed by sulphur fumigation and by formaldehyde gas in the strengths in which these disinfectants are usually employed. The gases can only be depended upon as surface disinfectants. In disinfecting ships, warehouses, dwellings, and other places infested with rats, fleas, and vermin, sulphur is better than formaldehyde, because formaldehyde gas fails to kill the higher forms of animal life.

(13) A temperature of 70 degrees C. continued a short time is invariably fatal for the plague bacillus. The ordinary antiseptics are all efficacious in their usual strength for nonspore-bearing organisms. Efficient surface disinfection may be accomplished by exposing objects all day to the direct sunshine on warm days. The temperature in the sun must be above 30 degrees C.

Small-pox.—This disease has threatened us throughout the year, on the Atlantic and the Pacific coasts and from the neighbouring republic across the border. Its continued presence in the United States has necessitated the maintenance of frontier medical inspectors and guards at those of your unorganized inland quarantines where the threatening seemed the most serious from time to time. In addition to this we have been called upon to handle an outbreak of small-pox in the North-west Territories, the sanitary administration of which Territories was transferred to you by the Hon. the Minister of the Interior, at the beginning of April last. By your instruction Dr. James Patterson, of Winnipeg, was sent out to the Territories to take medical charge of the small-pox outbreak. He went first to the Edmonton district and then to Regina where he continued the work in harmony with the North-west government and in accordance with the provision of the Territorial Health Ordinance.

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This work, frontier and territorial, has called for your employment of some sixty additional quarantine officers.

Dr. Patterson, in the territories, performed his onerous duties most satisfactorily. By his excellent work and that of his assistants, the outbreaks in the different parts of the territories were promptly and efficiently handled and controlled.

The frontier quarantine on the White Pass and Yukon Railway at Log Cabin, for the protection of northern British Columbia and the Yukon Territory, was again established and maintained.

On the frontiers much good was accomplished by straining out actual cases by inspection, and protecting by vaccination the unprotected who have been exposed, and thus doubly limiting the importation of fresh centres of infection into the midst of our people.

Partly on account of small-pox in the United States generally, and partly on account of plague in San Francisco, the suspension has been continued of your ministerial order which excluded vessels from San Francisco and United States ports north of it from the quarantine regulations.

And on the Atlantic side, owing to the recent increase of this disease in New York and the New England States, the exclusion from the quarantine regulations of vessels from New York and United States ports north of it has been similarly suspended.

In the United States, this disease has prevailed throughout the year. The Public Health Reports officially published at Washington, give the total of cases actually reported between January 1 and June 30 this year, as 30,710, and from July 1 to the end of this month, as 13,226. Owing to the mildness of the type these figures may be assumed to be far from exhaustive, as many, many cases were not reported at all. Still they give a fair idea of the epidemic nature of the present visitation of the disease.

Of the 30,710 cases reported during the first six months of this year the deaths only numbered 552, the very small average of not quite 1.80 per cent. Of these 1,376 cases, and 235 deaths were in the City of New York, where possibly they may have been of a different and more severe type introduced by the numerous foreign immigrants arriving at that port. Deducting these New York cases, there remains for the rest of the country a total during the six months of 29,334 cases, with only 317 deaths, or an average mortality of only 1.08 per cent.

Since July 1, in the 13,226 cases reported, there have been but 431 deaths, an average of 3.26 per cent. Here again 562 cases and 148 deaths were in New York. Outside of that city in all the United States there have been reported since July 1, 12,664 cases with 283 deaths, an average mortality of only 2.24 per cent.

Philadelphia and Boston are also ports of immigrant arrivals. In the former city there have been since July 1, 292 cases and 32 deaths. In Boston, 79 cases and 7 deaths. The total number of cases in these three ports of immigrant arrival, New York, Philadelphia and Boston would therefore be 933 and the deaths 187, an average of 20 per cent. This leaves for all the United States, except these three cities a total of 12,283 cases since July 1, and only 254 deaths, the very low proportion of about 2 per cent.

In the fourteen states, bordering on Canada, from Alaska to Maine, inclusive, there are at present 8,728 reported cases.

The threatening and the presence of even this mild form of the disease interrupt and interfere with trade and commerce, travel and traffic. It is not, however, an un-mixed evil. Many may pass through its lenient hands without much illness, pitting or mortality. Many, very many more will be vaccinated for fear of it.

Between the two classes a large proportion of the people of Canada should be rendered immune to small-pox. And so for some years the Dominion may be safe from any severe epidemic of this disease.

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Small-pox has been reported from very many places and countries during the year. The most marked outbreaks were in Naples, with 1,311 cases reported between June 10 and September 7. Glasgow last spring with 1,527 cases. Paris with 543 deaths, the largest number of deaths from small-pox registered in Paris for nineteen years ; and the present outbreak in London, England. Commenting on the London small-pox situation the *British Medical Journal* of September 14, says :

Though the last published figures of the number of cases of small-pox admitted into the hospitals of the Metropolitan Asylums Board show a considerable decline, it would, we feel confident, be a mistake to found on this any very sanguine expectation that the outbreak of small-pox in London is coming to an end. In the eight weeks ending September 7, 135 cases of small-pox were admitted into hospital, and of this number 113 were admitted during the last three weeks of the period ; the number for the week ending August 24 was 30 cases, August 31, 52 cases, September 7, 31 cases. It would be rash to assume that the decline shown last week will continue, and, as a matter of fact, we learn that in the first three days of this week 25 cases were notified, 6 on Sunday, 10 on Monday, and 9 on Tuesday. The cases admitted during the last eight weeks have not been limited to any one part of London ; they have come from St. Pancras, Wandsworth, Marylebone, Bethnal Green, Islington, Hackney, Southwark, Paddington, Hammersmith, Lewisham, Westminster, Hampstead, Holborn, Finsbury, Chelsea, Stoke Newington, Lambeth and Kensington. This alone, by the mere multiplication of foci of infection, constitutes a source of danger.

But there is another point with regard to the present position of London which must give cause for anxiety : it is that the number of unvaccinated children has been steadily increasing for some years past, and is now undoubtedly very large. Dr. Climson Greenwood, the President of the Society of Public Vaccinators, has put down the proportion of unvaccinated children in elementary schools as one-third, and there are grounds for believing that this estimate is not excessive. We find, on reference to the last report of the Medical Officer to the London County Council, that the proportion of children unaccounted for in respect to vaccination has increased steadily since 1888. In that year it was 10·3 per cent of total births ; in 1892 it had risen to 18·4 ; and in 1897, the last year dealt with in the report, to 29·1. The number of persons over 10 years of age vaccinated in infancy who have not been revaccinated must also be very large, and will swell the percentage of the population of London specially liable to contract small-pox and to suffer from it in a severe form.

The same paper also remarks :

One fact in which some degree of satisfaction may be found under existing circumstances is that small-pox has evidently lost none of its influence as an incentive to vaccination. It appears that several months ago the corporation of Glasgow, foreseeing the possibility of an epidemic, advertised free vaccination and revaccination, but with very little result. Cases of small-pox were then very few, and, in the absence of the legislation which the government led us to expect in 1898, there was no sufficient stimulus towards accepting the municipal offer. Now that the danger is becoming more urgent, now that small-pox cases have mounted into hundreds, and that deaths are mounting into scores, revaccination is being largely resorted to in Glasgow, so that a very considerable section of the population must already be protected ; indeed, no fewer than 240,000 revaccinations are recorded since the beginning of the outbreak. One of the advantages of calf lymph is that the available stock can be so quickly multiplied as to prove rapidly sufficient for the most extensive demands. If reliance had now had to be placed on humanised lymph taken from the arms of infants, the hurried revaccination of Glasgow would have been almost impossible.

In connection with this extensive revaccination (240,000) Dr. Chambers in a report to the corporation of Glasgow, after discussing the numbers of cases and their distribution in the city, gives a very reassuring statement in regard to the efficacy of revaccination as shown by the present experience of Glasgow. The statement, avowedly made to meet the efforts of the antivaccinists to discountenance the

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value of revaccination, is that no case had been admitted to hospital where successful revaccination had taken place prior to the contraction of the disease. It is also added that, in cases where persons had been vaccinated while the disease was incubating, the severity of an attack so far from being increased, might be greatly modified.

The *Cincinnati Lancet-Clinic* prints a letter from Dr. E. Stover in answer to an anti-vaccinationist as follows:

'1. No historical fact is better established than that, before the discovery of vaccination, small-pox was one of the most fatal and dreaded scourges which afflicted humanity. It swept over Europe, leaving death, devastation and terror in its path; indeed, so widespread was the disease that, as the historian Macaulay informs us, it was a rare thing at one time to find a person in London not disfigured or marked by that dread disease. To-day small-pox is one of the rarest diseases, and scarcely figures in mortality statistics. You say this reduction has been brought about by sanitary science, whatever you may mean by that, because if vaccination is not one of the most effective sanitary measures the world has ever seen, I do not know what you would designate it. 2. The English, German, French or American soldiers who have been properly vaccinated can be brought face to face with small-pox in the unhealthy tropics, in places reeking with filth, and all sanitary conditions much worse than the London described by Macaulay, and these soldiers are almost absolutely immune against the disease. Why is this? Does the sanitation of the countries from which they come, thousands of miles away, protect these men, in the midst of unnatural and health destroying environments, against a disease which is destroying thousands of acclimated natives? 3. Why is it, if vaccination does not prevent small-pox, that epidemics of the disease can be brought under control by this means, and by this means alone? Else why should the bitter opponents of the measure resort to it for safety in the face of danger, as they did in the epidemic in England a few years ago? 4. I have often thought that through generations of vaccination a vital resistance has been created, and a partial immunity established, so that when small-pox attacks even those who have not been personally vaccinated, owing to the mitigating influence of vaccination in their ancestors, the disease assumes a milder form. 5. As every observer knows, small-pox epidemics nearly always follow comparatively long periods of immunity from the disease, when the people have become careless, neglected to be vaccinated, and there are large numbers susceptible to the disease. 6. But the antivaccinationist holds up his hands in horror, and with a scared look and bated breath calls our attention to the horrible diseases and occasional deaths caused by vaccination. Admitted that syphilis and other diseases have been conveyed, and blood-poisoning caused in rare instances (and they are exceedingly rare, compared with the whole number of vaccinations), still the evil is but a tiny trickling rill alongside the great river of beneficence which this grand discovery has brought to soothe and save suffering humanity. With approved modern methods for the production and marketing of bovine vaccin virus, and proper antiseptic or aseptic precautions in making the vaccinations, even these infrequent accidents ought to be almost entirely prevented. It would be just as fair to formulate an opinion as to the propriety and justifiability of abdominal operations and major surgical operations from their pre-antiseptic and pre-aseptic mortalities as it is to condemn vaccination for accidents and dangers that attended the use of infected virus and careless methods of performing the operation years ago, rather than to judge it by the results following the use of pure bovine virus and aseptic operating of the present time. 7. Then, too, a method which has passed through the ordeal of more than a hundred years of the closest investigation and most searching criticism, which has received the unqualified approval and support of nearly all scientific physicians in the whole civilized world, which has lifted the dark cloud of terror which paralyzed humanity so that the great majority of people have come to regard the once dread disease as an insignificant danger; when, I say, any preventive measure has accomplished such results as these, he is, indeed, a bold man who will advocate its discontinuance, unless he has something better to offer

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in its place. 8. I have often thought that, with the great benefits and small dangers of vaccination so generally recognized, and its benefits established on such a firm foundation, it was largely a matter of supererogation to resort to such severe measures in warding off small-pox. The persons who will not protect themselves against the disease do not have "common sense" enough to enjoy good health, and should be left to their fate.'

With regard to this statement of the case one or two remarks suggest themselves. In section 4 the writer refers to a possible partial immunity established even in the unvaccinated through their succession to generations of the vaccinated. Observation does not confirm this. The severity of the attack still depends upon the condition of the individual as to his or her own personal vaccination. The recently vaccinated escape, many with old marks take it lightly, but in the unvaccinated the confluent form with deep pitting or death still occurs as always. The doctrine of an inherited immunity is a dangerous one, tending to the neglect of vaccination and revaccination under a false sense of security.

With his last sentence I agree. Certainly adult sufferers from small-pox are unworthy of pity. But I would go further and contend that as even one case of small-pox causes so much disturbance, mental distress, and pecuniary loss in a community, as it is an entirely preventable disease, and as the means of prevention are readily within the reach of all, having the small-pox should be constituted a misdemeanour, punishable by fine or imprisonment or both. No man has the right to voluntarily become a public nuisance, and bring commercial and other injuries upon his community.

Much of the opposition that still is to be found here and there against vaccination may be attributed to two causes: the occasional occurrence of small-pox in one who has been unsuccessfully vaccinated and the occasional occurrence of a purulent sore (a bad arm), following the little operation. Assuming that the vaccination has been properly performed with good vaccine, neither of these results should occur in healthy persons. It cannot be forgotten, however, that the production and sale of vaccine is a commercial enterprise. And when a large demand arises there must at least be the temptation, in default of an adequate supply of the best, to issue some stock that may have been laid aside, or to take from a calf a larger amount than the vesicles can furnish, and thus send out a mixture of lymph and purulent matter. And in the case of glycerinized vaccine, to issue it too early. I do not say that the best firms do this. But the temptation must arise to do so, rather than to decline to fill orders however large and let them be diverted to competing firms. The solution of this difficulty and the entire removal of any such suspicion in any case of failure or of abnormal inflammation, would, in my opinion, be the preparation of all vaccine at a national laboratory by salaried government officers, and its issue under a government stamp. I would recommend the extension of this to include the preparation and issue of the various prophylactic and curative fluids and serums. Tuberculin, Haffkein's plague preventive fluid, and the anti-toxins of plague, cholera, diphtheria, anthrax, &c. There would then be no temptation for commercial or financial reasons for the issue of inferior material, and the maximum protection and confidence of the public could be attained.

The Germ of Small-pox.—Efforts have for a long time been directed to the isolation of the hypothetical exciting agent of variola and its modifications. Sacco, in 1809, found granules in vaccine lymph; Beale, in 1863, minute transparent or hyaline particles; Hallier and Zurn, in 1867, and Keber, in 1868, micrococci; Chauveau and Burdon-Sanderson, in 1868, minute granular bodies; Cohn, in 1872, again micrococci; and since then numerous observers have found different organisms. L. Pfeiffer, in 1887, although he noted the presence of both fungi and bacteria, expressed the belief that the specific agent was a sporozoon. Renault, in 1881, had already described, in the epithelial cells of the vesicles in cases of vaccinia and variola, peculiar bodies that he regarded as parasitic; and subsequent observers, including also Pfeiffer, have made further studies that strengthen the probability that the cause of these disorders is really a protozoon. It is not unlikely that many of the bodies

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described are merely accidental, and experience has amply shown that if they be removed—as occurs in the present methods of preparing glycerinated lymph—the usual unpleasant complications of vaccinia are generally avoided.

The germ of small-pox has heretofore received no general recognition, though the conviction that variola is a germ disease is unavoidable. The latest on this subject is to be found in the *British Medical Journal* for February 23, in which are two communications bearing on this subject. Dr. M. Funck, director of the Institut Sérothérapique, and chief of the bacteriologic laboratory of the University of Brussels, reports the results of his studies in this direction and the finding, in vaccin and small-pox pustules, of morphologically identical organisms which he considers as the cause of vaccinia and variola. These appear under three forms, representing different stages of the same protozoon: 1, an isolated green sphere showing slow movements; 2, the same infecting epidemic cells, and 3, a morula form consisting of agglomerated sporoblasts; the last is the one most frequently found in old vaccins, while the first form is more common in perfectly fresh material. The inoculation of these organisms into susceptible animals produced all the symptoms of vaccinia and the subsequent immunity. In the pustules of confluent small-pox the same elements were found and their behaviour will be described in a forthcoming paper. From these facts, Funck concludes that variola and vaccinia are identical, that vaccinia is only the attenuated form of small-pox, and that the immunity it produces is not an exception to the general laws of specific immunity. The discovery of the protozoon is not claimed as a new one, as its presence in vaccin corpuscles was recognized by L. Pfeiffer—in 1887—whose work is highly spoken of by Funck. That bacteria are not the active agents in vaccinia the author considers proved by the fact that he finds vaccin matter after a certain period absolutely free from microbes, though still active, and the pustules thus produced are also themselves sterile. This seems to have some important practical bearings and probably explains the well known better action of ripened vaccin. The second communication is by Monckton Copeman, medical inspector to the local government board in England, who describes zooglea-like masses found in collodion capsule cultures of vaccin lymph sealed up and placed within the peritoneal cavities of rabbits and dogs, the method being the same as that followed by Nocard and Roux in studying the micro-organisms of bovine pleuro-pneumonia. The fluid contents of these capsules was found capable of producing typical vaccinia in the calf. He has since demonstrated apparently similar organisms in genuine small-pox in man. Whether these zooglea masses are the same as the third type of manifestation of the sporozoon of Funck is not entirely clear, but they are described as 'made up of bodies resembling spores, only the periphery of which took the stain.' There is no record of the detection of any actual microbe. It seems possible that we will at least have light thrown on the etiology of this disorder, the first in which artificial immunity was secured, but one of the last so far to evade our search for its germs.

Asiatic Cholera.—This disease continued during the year in its usual habitats, notably in India and China. Limited outbreaks of it occurred also in the Straits Settlements, in the Argentine Republic, in Java and Japan.

Yellow Fever.—The anti-yellow fever serum of Drs. Bellinzaghi and Felipe Caldas has proved inefficacious as a means of prevention or cure. The special commission presided over by Major Harvard, chief surgeon in Cuba, which was appointed to investigate this serum reported adversely to it.

An abstract of the interim report of the commissioners sent out by the Liverpool School of Tropical Medicine has been issued. It is as follows:—

1. Sufficient research reveals the presence of a fine, small bacillus in the organs of all fatal cases of yellow fever. We have found it in each of the 14 cadavers examined for the purpose. In diameter, the bacillus somewhat recalls that of the influenza bacillus; seen in the tissues, it is about 4 micromillimeters in length.

2. This bacillus has been seen in kidney, in spleen, in mesenteric portal and axillary lymphatic glands, &c., taken from yellow fever cadavers directly after death. In the contents of the lower intestine apparently the same bacillus is found often in extraordinary preponderance over other micro-organisms. Preparations of the pieces of mucus, which are usually, if not always, present in yellow fever stools, at times may almost present the appearance of pure cultures.

3. Preparations of the organs usually fail to show the presence of any other bacteria, whose absence is confirmed by the usual sterility of cultivation experiments.

4. It is probable that this same bacillus has been met with but not recognized by 3 other observers. Dr. Sternberg has mentioned it, and he has also recorded the finding of similar organisms in material derived from Drs. Domingos Freire and Carmona y Valle, but he did not recognize its presence frequently, probably on account of the employment of insufficiently stringent staining technique.

5. It is probable that recognition has not been accorded to this bacillus by reason of the difficulty with which it takes up stains (especially methylene blue), and by reason of the difficulty of establishing growth on artificial media.

6. The most successful staining agent is carbolic fuchsin (Ziehl), diluted with 5 per cent phenol solution (to prevent accidental contamination during the long staining period) immersion for several hours, followed by differentiation in weak acetic acid. Two hours' staining may fail to reveal the bacilli, which appear after twelve to eighteen hours. The bacilli in stools are often of greater length than those in the tissues, and they stain rather more easily; naturally the same is true of cultures.

7. Since the bacilli are small and comparatively few in numbers they are difficult to find. To facilitate matters at our last necropsies (14th and 15th) a method of sedimentation has been adopted. A considerable quantity of organ juice is emulsified with antiseptic solutions, minute precautions against contamination and for control being taken; the emulsion is shaken from time to time and allowed to settle. The method is successful and may form a ready means of preserving bacteria containing material for future study. The best fluid for the purpose has yet to be worked out; hitherto normal saline with about one-fifth per cent sublimate has been employed.

8. Pure growths of this bacillus are not obtained in ordinary aerobic and anaerobic culture tubes.

9. Some pure cultures have been obtained by placing whole mesenteric glands (cut out by means of the thermo-cautery), into broth under strict hydrogen atmosphere. Investigations into the necessary constitution of culture media for successful cultivation are in progress.

10. Much search was made for parasites of the nature of protozoa. We conclude that yellow fever is not due to this class of parasite. Our examinations were made on very fresh organ juices, blood, &c., taken at various stages of the disease, with and without centrifugalization, and on specimens fixed and stained in appropriate ways. We may add that we sometimes have examined the organs in a fresh state under the microscope within half an hour after death.

Drs. Walter Reed, James Carroll and Aristides Agramonte, of the United States Army, the United States Commission, under the superintendence of Dr. Reed, which has been making experiments at Quemados, Cuba, on the transmission of the yellow fever germs by the mosquito, has obtained extremely satisfactory results.

Dr. Reed says the experiments show, beyond a doubt, that there is no contagion from an infected person or from infected clothing, but that the mosquitoes alone are responsible for the spread of the disease. In the course of the commission's investigations six non-immune persons were infected direct by the bite of mosquitoes which had previously bitten yellow fever patients, and five of these developed yellow fever.

The last experiment proved conclusively, Dr. Reed contends, the theory of mosquitoes being the intermediary host. A special building was constructed of disinfected material, and one of the rooms was divided into two sections by a wire mosquito screen. In one section were placed disinfected bedding and clothing, and in

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the other bedding and clothing from the yellow fever hospital which had not been disinfected.

A non-immune occupied each of the two sections. In one section were put several infected mosquitoes. The patient remained in this room only long enough to be bitten, and in four days a pronounced case of yellow fever developed. The patient is now convalescent. The other subject slept in the infected bedding for many nights and has not contracted the fever.

Two patients have been sleeping for twenty nights in garments worn by yellow fever victims, and in bedding from the yellow fever hospital.

Dr. Reed says they are growing fat and that, in no instance in the course of the commission's investigation, has a case of yellow fever developed from exposure to infected bedding or clothing.

Dr. Reed has published the following conclusions :

'1. The mosquito (*Culex fasciatus*) serves as an intermediate host for the parasite of yellow fever.

'2. Yellow fever is transmitted to the non-immune individual by a mosquito that has previously fed on the blood of those sick with this disease.

'3. An interval of about twelve days or more after contamination appears to be necessary before the mosquito is capable of conveying the infection.

'4. The bite of the mosquito at any earlier period after contamination does not appear to confer any immunity against subsequent attacks.

'5. Yellow fever can also be experimentally produced by subcutaneous injection of blood taken from the general circulation during the first and second days of this disease.

'6. An attack of yellow fever, produced by the bite of the mosquito, confers immunity against a subsequent injection of the blood of an individual suffering from the non-experimental form of this disease.

'7. The period of incubation in thirteen cases of yellow fever has averaged from forty-one hours to five days and seventeen hours.

'8. Yellow fever is not conveyed by fomites and hence disinfection of articles of clothing, bedding, and merchandise, supposedly contaminated by contact with those sick of this disease, is unnecessary.

'9. A house may be said to be infected with yellow fever only when there are present within its walls contaminated mosquitoes, capable of conveying the parasite of this disease.

'10. The spread of yellow fever can be most effectually controlled by measures directed to the destruction of mosquitoes, and the protection of the sick against the bite of these insects.

'11. While the mode of propagation of yellow fever has now been definitely determined, the specific cause of this disease remains to be discovered.'

The reports issued monthly by Major W. C. Gorgas, Chief Sanitary Officer, on the health conditions in Havana, continue with their unvarying statements of lessening mortality.

From April 1 to October 1 of this year, yellow fever caused only five deaths in Havana, as compared with 659 in the corresponding period of 1897, and an average of 296 deaths for the past eleven years. As accounting for the great improvement in the condition of public health, Major Gorgas says : 'This year, since March 1, we have had one hundred men daily engaged in killing mosquitoes in every way we know how. The result is that, instead of having fifty-two deaths from yellow fever and thirty-two from malarial fever, we have had two deaths from yellow fever and eleven from malarial fever—a difference of seventy-one deaths, under those two heads, in favour of this year.

As to yellow fever,' Major Gorgas writes, 'there has never been an approximation to this condition at any time in the last one hundred and fifty years. This is the first year, during that period, in which we have known that yellow fever was conveyed by the mosquito ; and during February the Military Governor directed

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that our disinfection be carried out on these lines. I attribute our very surprising results to this fact. As each month passes, we feel more and more confident that the problem of the control of yellow fever has been solved by the discovery that the mosquito is its conveyor ; and little anxiety is now felt when a focus develops in the city. From repeated successes in the last six months, we believe that, with present disinfection methods, any infection from yellow fever that may be introduced into the city can be stamped out.'

Beri-beri.—The cause of that mysterious tropical disease, beri-beri, appears to have been at last discovered. Captain E. R. Rost, I.M.S., civil surgeon of Meiktila, Burma, has been investigating the connection between beri-beri and a microbe found in rice and Jowari grain, and in the rice liquor which coolies and sepoys drink. He concludes that this microbe is the cause of the disease. But he is not the first to make this suggestion. In May of last year, Mr. Charles Hose, D.Sc., who is not a medical man, but a naturalist, who has contributed largely to the national museums, has handed to Dr. Strangeways Pigg, of Cambridge, a paper in which he stated the results of investigations which he had been carrying on for some years in Borneo. He had suffered from the disease and it was mainly to this circumstances that was due his attention to the subject. He found that in Borneo the disease was much more prevalent among men than among women, that it was frequently contracted on a journey in the jungles of the interior, was more prevalent at certain seasons, and frequently occurred in outbreaks among Chinese coolies. The women in Borneo, who very rarely leave the villages for any length of time, live mainly on freshly husked rice, while the men are frequently absent in the interior on rubber-collecting expeditions for several months, and live on rice, which they carry in bags, and which becomes mouldy in the damp climate. Similarly the rice supplied in jails has been kept in bags for considerable periods, and is often mouldy. By microscopic examination Mr. Hose found a fungoid growth on this mouldy rice. He then tried the experiment of feeding three monkeys (*macacus nemestrinus*) on old rice. Two of the three developed the characteristic nerve symptoms of the disease, but not the characteristic edema of the legs. Thirty-nine Dayaks, who had contracted beri-beri during their expeditions were placed in villages where only freshly-husked rice was used, 33 recovered and 6 died. On the other hand, of 128 who continued to live on imported rice 47 died. Mr. Hose has forwarded to Cambridge specimens of this mouldy rice for examination.

It is reported that beri-beri has broken out among the Chinese coolies employed in Christmas Island, which owing to its isolation has only recently become inhabited. This offers a unique opportunity for the scientific study of the disease. The Christmas Islands Phosphate Company, Billiter Street, E.C., has offered the sum of £1,000 to the London School of Tropical Medicine towards the expenses of a scientific expedition to the Christmas Islands for the investigation of beri-beri. Sir John Murray has offered to contribute £100 for the same purpose, and there is reason to believe that the Colonial Office will also make a grant in aid of the expedition. The Christmas Islands Phosphate Company has offered a passage to members of the expedition on board a steamer which will leave London on September 30, and Cardiff on October 4, calling at Port Said fourteen days later. The committee of the school has not yet finally selected those who are to take part in the expedition.

Inoculation against Enteric Fever.—Although the subject is being industriously investigated, it cannot be said that a final opinion has been reached as to the utility of protective inoculation in the prevention of typhoid fever. Statistics of a favourable character have in the past been published, and the most recent announcement in this connection points in the same direction. Prof. A. E. Wright (*Lancet*, February 9, 1901, p. 399), of the Army Medical school at Netley, makes, through the kindness of Lieutenant-General Sir George Luck, the statement based upon official compilation that of 539 officers, men and women connected with the Fifteenth Hussars at Meerut, India, 360 received protective inoculation in England against typhoid fever and 179 did not. Of the former 2 (0·55 per cent) were admitted to the hospital, suffering from typhoid fever,

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with 1 death (0·27 per cent) ; while of the latter 11 (6·14 per cent) were attacked by the fever, with 6 deaths (3·35 per cent). As is well known, figures cannot under all conditions be implicitly relied upon, but in the present instance there seems to be no good reason to deny their validity or dispute the inferences that they irresistibly compel ; so that the conclusion seems amply warranted that the reduction in incidence of, and mortality from, the disease in the inoculated, was, in some degree at least due to the measures employed.

Dr. H. M. Cullinan, reporting on an outbreak of enteric fever in the Richmond Asylum, Dublin, which occurred in the autumn of last year, gives the following results :—

	Average Strength.	No. of Cases.	No. of Deaths.	Percentage of Cases.	Percentage of Deaths.
Uninoculated.	298	30 (— 1 ?)	4	10·1	1·3
Inoculated...	339	5 (+ 1 ?)	1	1·5	0·3

Wright gives also the following statistics dealing with the incidence of enteric fever and the mortality from the disease for the year 1900 in the inoculated and uninoculated among the British troops in Egypt and Cyprus :

	Un-inoculated.	Inoculated.
Average annual strength.....	2,669	720
Number of cases of enteric fever.....	68	1
Number of deaths from enteric fever.....	10	1
Percentage of cases calculated on average annual strength....	2·5	·14
Percentage of deaths calculated on the same basis.	·4	·14

These figures testify to a nineteenfold reduction in the number of attacks of typhoid fever and to a threefold reduction in the number of deaths from that disease among the inoculated.

Henry Cayley believes that the statistics of the work done in South Africa offer very strong evidence in favour of the protective power of the antityphoid inoculation when this is very carefully performed, and that there is probably necessity for two inoculations at a suitable interval. During the period of five months that the hospital was stationed at Kroonstadt there were ninety-two admissions for enteric fever and eleven deaths. Of these ninety-two patients, fifteen said they had been inoculated, a few were doubtful, and about seventy had not been inoculated. Of the eleven who died, one had been inoculated once, the others had not been inoculated. From these figures probably no conclusions or even reliable inferences can be drawn, but it seems positive from the cases observed that the attacks of enteric fever were, as a rule, much milder in the inoculated than in the non-inoculated, and the duration of the disease was much less.

Tuberculosis.—In view of the urgent importance of meeting with some concerted action the ravages of this disease, which recent scientific investigations have done so much to expose, a Canadian Tuberculosis Conference was summoned to meet in Ottawa in February last, under the patronage of their Excellencies the Earl and Countess of Minto. As a result of this kindly action on the part of His Excellency the Governor General, the Canadian Association for the Prevention of Tuberculosis has been formed.

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At the opening meeting a series of resolutions were submitted, and amongst them the following :

2. Resolution No. III.

Whereas, the Constitution of the Dominion of Canada especially delegates to the federal government general quarantine in matters of public health, both of men and animals, as well as matters of statistics; and in view of the fact that in tuberculosis we are dealing with a disease which not only lessens national prosperity through the loss of lives, but also by enormous expenditure through sickness and loss of labour.

Resolved, that it is the view of this Conference that in a disease whose influence extends from questions of the inspection of immigrants to that of imported cattle, and affects the output of our farms and our factories, the federal government may greatly assist in the fight against tuberculosis by—

1. Preventing the entrance into the country of tuberculized immigrants, and tuberculized cattle.

2. Arranging with the Registrars General of the provinces for a system of Federal Health Statistics of deaths.

3. Establishing a Sanatorium in each of several typical Canadian climates, where under careful medical supervision the therapeutic effects of dry or moist, high or low, forest or prairie climates may be scientifically studied, and the results published for the information of the general public.

4. Arranging with the railway companies to provide special facilities, both as regards conveyances and rates, for the transportation of tuberculized patients to such Sanatoria.

In the discussion on these resolutions I spoke as follows :—

‘I am glad to have this opportunity of joining with previous speakers in the expression of appreciation of the importance of the subject of this conference, and in the hope that substantial and practical good may arise from it. I am glad to have this opportunity both in my private capacity as a physician, and in my official one as Director-General of Public Health and Sanitary Adviser to the Dominion Government.

The resolution now under discussion contains the proposition that the federal government may greatly assist in the fight against tuberculosis by preventing the entry into this country of tuberculised passengers.

Tuberculosis is a communicable disease. Therefore it is not desirable that cases of it should be imported, to become possible fresh centres for its diffusion amongst our people. These are propositions that are theoretically unquestionable and unassailable. Their recognition has given me anxious thought and study for years past. The theory is simple and easy. The crystallizing it into rules and regulations presents difficulties. Some of these I may briefly bring before you.

If tuberculous persons are to be quarantined or sent back where amongst them are you to draw the line ? Is the advanced case, with cavities and hectic fever, that is soon to cease to be a menace, to be held ? And is the beginning case, with a little prolonged expiration and thickening at an apex, that may develop into a danger for several years, to be allowed to freely enter ? Are all to be held ? or where between these extremes are you to draw the line ?

Then if you master that preliminary difficulty and succeed in finding some satisfactory criterion or standard of judgment, how are you going to apply the tests ? Vessels come to our ports on both oceans with hundreds of passengers on board. Are they to be detained until their chests can be percussed and auscultated and their expectoration examined microscopically ? This could hardly be done. And yet if not how is a trustworthy knowledge of their condition quoad tuberculosis to be obtained ?

Then if you have caught your tuberculized passengers, what are you going to do with them ? Our quarantines and quarantine hospitals are adapted for the short detention of acute infectious cases until they cease, by death or recovery within a time limited by weeks at the longest, to be a danger to the public health. But if we add tubercul-

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osis to the list of quarantinable diseases our quarantine stations will soon be filled with incurable cases of this disease to the practical exclusion of all others.

If tuberculous persons are to be refused admission to the country, deported and sent back, where again are you to draw the line? and how decide between different cases or stages before informing a family that one of the young daughters, we will say, is tuberculous, and must stay on board of, and go back by, the ship in which she came?

Moreover, if tuberculized persons are not to enter by our seaports, a similar law must logically prevail to forbid their entry all along the international frontier between us and the United States. And how is that to be carried out and enforced? And yet with such a law for our seaports and not for our frontier, tuberculous or doubtful cases need only ship to Portland or Boston, instead of Montreal or Halifax, and for Astoria or San Francisco instead of Victoria or Vancouver, and then come over the frontier by rail unchallenged. Thus our transportation companies would be injured without any protection to the country. Not being an island we can only move in these matters *pari passu*, with our southern neighbours.

Withheld by such considerations as these I have not yet been able to see my way to submit to my government any proposal to include tuberculosis amongst the quarantinable diseases. Of course as far as immigrants from Europe and from Asia are concerned it is evident that the place to examine and detain for tuberculosis would be not at the port of arrival but at the port of departure.

It might possibly be done during the days immediately before sailing. And of course stopping an individual or a family from sailing from the port of departure would not entail such hardships as the being sent back from the port of arrival after having crossed the ocean.

In my private and unofficial character I may perhaps be allowed to add that I look forward with hope to the day when Canada will have her Dominion Department of Public Health, with its medical officers responsible to this government in every passenger shipping port in Europe and in the Orient, for the inspection, vaccination and disinfection of intending immigrants to this country.

When that day comes something may be done for the culling out from amongst them, during the days before sailing, of tuberculized persons, likely—if allowed to enter the country—to become an additional menace to its public health.

Knopf says to call tuberculosis a 'dangerous, contagious disease' is unscientific, and not only tends to increase a useless fear in the minds of the public at large, but will add terrible hardships to the sufferings of the unfortunate consumptive. Pulmonary tuberculosis can only be called a highly communicable disease, and should never be classed among the acute infectious and contagious diseases.

To come in contact with a clean conscientious consumptive, who takes care of his infectious sputum, is not dangerous. In sanatoria and special hospitals for consumptives contagion is well nigh unknown.

Tuberculous passengers on steamers and railways.—This subject has been much discussed of late, and various methods have been recommended to prevent the dissemination of tuberculosis by a railway passenger suffering from the disease. Dr. George Chaffee, surgeon to the Long Island Railway, writing in the *Railway Surgeon* for July, 1901, suggests, among other safeguards, the following precautions: (1) To instruct the public in methods of prevention; (2) co-operation with boards of health; (3) the enactment of proper legislation, both state and national. 'A national law protects the various seaport towns of this country, and ever stands to support our health officers whenever they find it necessary to quarantine cases of small-pox, cholera, and yellow fever. Why should not a national law as well give tuberculous passengers the right to ask for a private room, or a compartment of a car—which is only another name for it—and also notify railway corporations to have these private rooms, or compartments, ready for immediate use when needed; thus protecting healthy passengers from infection, disease, and an untimely death. The railway men of this country

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stand at the head in the matter of business intelligence and enterprise, and I am satisfied that they will be found ready and willing to carry out their part of any legislation that may be enacted for the prevention of tuberculosis. It would seem to be only just and right that there should be national legislation on this subject, whereby railway corporations might be requested to furnish compartment cars and at points near health resorts entire sanitary cars, and which would oblige tuberculous passengers to occupy such compartments, and to comply with all the requirements of such a law. Such a law should provide for the disinfection of every compartment or sanitary car at the end of every run, if it has been occupied by a tuberculous passenger, and a record made and filed of the disinfection.

In July last, I attended as a delegate of the Canadian government the British Congress on Tuberculosis. Upon my return I had the honour to submit to you the following report :—

Some 2,500 British and foreign delegates accepted the invitation to the Congress on Tuberculosis which His Royal Highness the Duke of Cambridge opened on July 22, on behalf of the King. These delegates included many of the most eminent pathologists and physicians in the world ; they represented the new science in medicine and surgery. Two years ago the then Prince of Wales, as president of the National Association for the Prevention of Consumption, nominated some of the delegates who went to Berlin to take part in the first congress on consumption, and it was then impressed on the British representatives that a similar meeting in London was greatly to be desired. His Royal Highness at once gave his sanction, and agreed personally to become president of the congress. The death of the Queen and his ascent to the Throne alone prevented the carrying out of this programme.

Apart from the usefulness of the congress in affording an opportunity to experts to exchange their views on the subject, much good may be expected from the interest which the congress has aroused generally. ‘Government of the people by the people for the people’ is the present-day principle of legislation. Until the public has been adequately instructed in the risks incurred under present circumstances and the possibilities afforded by hygiene and medicine, it is useless to expect any demand to arise for the legislation and expenditure which those who are best fitted to speak declare to be necessary to stay the scourge. It is to be hoped that the lessons of the congress will spread far beyond the limits of the volumes of its transactions. As to the arousing of public interest, it is a good omen that His Majesty has always been keenly alive to the need of further effort, and that the first year of his reign has been signalized by a congress on a subject so vital to the interests of the nation. And that the Governor General of Canada has also caused the formation of, and consented to preside over, a Canadian association for the prevention of this disease.

Great stress was very rightly laid upon the curability of the disease, if taken in time. It was advocated, however, that to secure such early treatment it would in many cases be requisite to render aid to the dependents in addition to treating the patient. One advantage accruing from such procedure is that the patient, freed from anxiety for his family, would enjoy a much better hope of recovery. The need of increased efforts in routine sanitary administration was not forgotten. All are agreed upon the possibilities for good in the amelioration of the housing of the poor. Almost as much importance also is to be attached to the proper supervision of tenement houses as to the clearing of unhealthy areas.

All speakers agreed in regarding human sputum as the chief vehicle of tuberculous infection amongst the human race. The modern education of consumptive in-patients at hospitals and sanatoria, and the printed directions distributed in out-patient departments show patients how they may—by the control and destruction of their expectorations—avoid infecting their relations and friends.

In short general hygienic knowledge in regard to the nature and prevention of tuberculosis is being gradually published amongst all classes in civilized countries. Yet it is not likely that infection by sputum can be suppressed so long as it remains

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the popular custom for persons, healthy or unhealthy, to spit in the streets, in omnibuses, in railway carriages, and on the floor of waiting rooms, &c.

In his public address before the congress, Professor Brouardel, of Paris, dwelt specially on the evils of this deplorable habit of spitting.

'The danger is in the sputum, which contains thousands of contagious germs. To expectorate on the ground is a disgusting and dangerous habit. Once this habit has quite disappeared, tuberculosis will decrease rapidly.'

Gradually in all countries the public are beginning to realize that personal care and cleanliness are necessary to obviate contagion, and are also realizing that other idea, equally important, that a consumptive patient is only dangerous if the necessary precautions are not taken around him, and if he himself does not take them to protect his relatives, friends and fellow-workmen from contagion.

The generally accepted beliefs that tuberculosis is not hereditary, and that it is not necessarily incurable were also again dwelt upon in this congress. With regard to heredity, Professor Brouardel dismisses it with the phrase: '*On ne naît pas tuberculeux mais tuberculisable.*' And stress was again laid upon the importance of the open air treatment, with rest and generous diet, in the treatment of the disease.

It will probably be generally admitted that the feature of the congress was the address by Dr. Koch, more particularly that part dealing with the alleged non-identity of bovine and human tuberculosis and the non-transmissibility of the disease from the one to the other species. The author's position and reputation are such that the greatest consideration should be accorded to any opinion expressed by him, no matter to what extent his pronouncements may be at variance with previously accepted doctrines or experience. In the present case Dr. Koch has startled the scientific world by declaring that the bacillus of bovine tuberculosis is not the same as that of the human disorder, that the bacilli from the latter will not infect the former, and that there is practically no real danger of any transmission of infection from tuberculous cattle to man.

His actual words in this connection were :

'Though the important question whether man is susceptible to bovine tuberculosis at all is not yet absolutely decided, and will not admit of absolute decision to-day or to-morrow, one is nevertheless already at liberty to say that, if such a susceptibility really exists, the infection of human beings is but a very rare occurrence. I should estimate the extent of the infection by the milk and flesh of tuberculous cattle, and the butter made of their milk, as hardly greater than that of hereditary transmission, and I therefore do not deem it advisable to take any measures against it.'

On the other hand, the current view and practice of local sanitary authorities in England have been in accord with the unanimous findings of two royal commissions (the first containing such experts as Sir G. Buchanan and Sir J. Burdon-Sanderson, and the last the late Sir Richard Thorne and Mr. Shirley Murphy).

In paragraph 11 of the last commission's report they say: 'We have had before us the unanimous finding of the Royal Commission on Tuberculosis, which reported in 1895 to the effect that tuberculous disease in bovine and other animals is identical with that in the human subject, and that it is communicable from one to the other, though the manifestation of the disease differs in some respects in the human subject from that in the lower animals. We have also considered their finding that 'any person who takes tuberculous matter into the body as food incurs risk of acquiring tuberculous disease.' Nothing that has come before us in the course of our inquiry has raised any doubt in our minds as to the accuracy of this opinion.' The views of the two commissions and those of Professor Koch are thus absolutely contradictory.

Yet the identity of human and bovine tuberculosis is ordinarily imagined to rest on Dr. Koch's own discoveries, when he found, and proclaimed to the world, that the lesions in man and those in animals contained bacilli absolutely alike in general and special characters. If this be the case, the assumption that bacilli can be transmitted from one organism to the other is, *à priori*, reasonable and likely, and the growing

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conviction on this point has never been seriously contested for the last eighteen years. Ordinary experience seems also to confirm this view. Dr. Koch points out the fact that, according to the hitherto recognized theory of transmission, cases of infection from milk ought to be exceedingly common, whereas instances of primary intestinal tuberculosis are extremely scarce. Here, however, there are observers who would meet him with a direct negative. Cases of specific bovine infection may be relatively rare, but there are a good many recorded.

If Dr. Koch is right, we shall all rejoice, and, therefore, we must earnestly hope that he is. But the question is, can his theory be safely accepted? That can only be decided by an examination of the facts on which it is based. No authority however great, can lay down a law in science by the mere weight of his opinion, and, with all due respect to Professor Koch, he is not altogether free from the suspicion of having jumped somewhat too hastily to conclusions in regard to other matters. The feeling throughout the congress seemed to be that Dr. Koch's statements were made prematurely, and upon insufficient data, and that, should they prove to be wrong, the amount of harm done may be incalculable. The evidence which he brought forward in support of his views by no means carried conviction to his hearers. One of these, at least, enjoys an eminence equal to his own. Lord Lister, who occupied the chair, spoke with no uncertain voice in this matter. While paying a generous tribute to his colleague, and to the profound interest of his paper, he pronounced the argument not conclusive, and declared that the question must be probed more deeply before the congress would accept Dr. Koch's hypothesis. It would, he said, be a grievous matter if the efforts now being made to secure the purity of milk and meat supplies should be relaxed, and then it should turn out, after all, that the danger was real. It is not usual to have a discussion on an address delivered before a general meeting, and the importance attached to the question by the chairman was sufficiently shown by his calling on several other members to speak upon it. Professor Nocard, the highest veterinary authority in France, Professor Bang, of Denmark, an equally distinguished expert, and Dr. Sims Woodhead, Professor of Pathology in the University of Cambridge, all responded, and spoke in the same sense as Lord Lister. Lord Lister said that, in Dr. Koch's address there was one point of special interest-namely, the relation between human and bovine tuberculosis. This was a matter of the most enormous importance, for if Professor Koch was right, prevention would be greatly simplified; but on the other hand it would be a serious and a grievous matter if the efforts being made to secure purity of milk and meat supplies should be relaxed and then it should turn out that after all bovine tuberculosis was dangerous to man. He confessed that the evidence produced by Dr. Koch of the incommunicability of human tuberculosis to animals appeared to him very conclusive, but it did not at all follow that bovine tuberculosis was incommunicable to man, and on that point he thought the evidence was not conclusive. There was a reason for thinking the contrary, and he instanced tuberculous infection of the mesenteric glands in children. In view of the enormous importance of the question the matter required to be probed more deeply before the congress would give its consent to this hypothesis. He was sure that those present would wish to hear the opinions of other authorities and therefore he would call upon Professor Nocard.

Professor Nocard, who is the leading authority on veterinary medicine in France, expressed his sense of the honour paid him and his pleasure in joining in thanking Prof. Koch for his admirable address. Speaking as a member of the veterinary profession, he referred to the movement they had recently had to encounter from exaggerated fears of the danger connected with animals; and perhaps there would be a reaction too far in the other direction. He thought they ought neither to exaggerate the danger nor deny its existence. He then pointed out that the facts related by Professor Koch might be explained by the modification which microbes undergo from their environment. With regard to incommunicability from animals to man, veterinary surgeons were not infrequently inoculated from bovine disease by accident, and there were many other

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examples of similar inoculation. He also referred to the facts brought forward by the late Sir Richard Thorne in his work on 'The Administrative Control of Tuberculosis.' Sir Richard Thorne had shown that tuberculosis had been diminished in England 50 per cent by sanitation, but there was one form of the disease that was an exception, namely, the abdominal tuberculosis of infants, or *tabes mesenterica*, and the sole reason why that had not diminished was that the infection was derived from tuberculous milk. He agreed with the chairman in desiring further inquiry.

Professor Bang, of Copenhagen, was then called upon by the chairman, and said that he thought Professor Koch had gone a little too far in saying that there was no necessity for taking measures against bovine tuberculosis. He had proved that there was very little danger in inoculating cattle from man, but the inoculation of man from cattle was a different matter, and they should be cautious in accepting his conclusions about it.

Professor Sims Woodhead (Cambridge) was also called upon. He said that Professor Koch's paper was a masterly exposition of his subject, but the very weight of his word going out to the world made it desirable that, if there was anything to be said on the other side, it should be known too. He was himself convinced that bovine tuberculosis did play some part in the extension of the disease, and he adduced several reasons for his opinion. Among them he referred to an experiment of Professor Crookshank's, and said that one such positive result outweighed a large number of negative ones. Professor Koch had told them that a commission had been appointed in Germany to make further investigations, and he suggested that the same should be done in England, and that the Minister of Agriculture should be approached with that object in order that the question might be settled by actual experiment. But for the present he strongly urged that they should continue to take precautionary measures.

On the day following Professor Koch's speech the general address was delivered by Professor Brouardel, Dean of the Faculty of Medicine of Paris, the leading sanitary adviser of the French government, and one of the highest authorities upon sanitary matters in Europe. On the question of the moment his views are diametrically opposed to those of the German bacteriologist.

Among other things he said :

'In our food danger lurks. Since Chauveau showed that it was possible for tuberculous germs in food to produce tubercles in the intestinal tract, attention has been turned to precautions for preventing the consumption of meats and milk from tuberculous animals. As far as meat is concerned, surveillance of the slaughter-houses in large towns achieves this. In Belgium this measure is also made to apply to the country ; but I do not know of any other kingdom where private slaughter-houses are inspected, and in them it is that phthisical cows, measly pigs, and diseased animals of any kind are slaughtered, and are able to escape inspection. This injurious food is consumed either as fresh meat, or in the forms of *pâtés* or sausages from which the tuberculous viscera have not been removed. With no wish to exaggerate the danger of the propagation of tuberculosis by meat, it cannot be overlooked. That the milk of cows with tuberculous inflammation of the udder is used is very clear. Your great hygienist, Dr. Richard Thorne, while pointing out that in England mortality in general of adults from phthisis has diminished since 1850, 45 per cent, regrets to see that from the same date infantile mortality from tuberculosis increased by 27 per cent. According to him, this increase is entirely due to tuberculosis in the abdomen, caused by ingestion of contaminated milk in infants under a year old ; for in England cow-houses are not inspected. It is well to add that in large concerns the milk from different sources is mixed and one cow only need be the victim of tuberculous udder in order to contaminate all the milk with which its milk is mixed. To prevent this method of propagation, strict inspection measures should be adopted, such as have been in use for several years in Denmark, Sweden and Norway, to the great advantage of public health. Until such necessary measures are actually adopted, there only remains the simple mode of avoiding risk from milk by boiling it, and this should be widely

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made known, in spite of a too wide-spread prejudice, which wrongly holds that boiled milk is less nutritious and indigestible.'

The next day the third and last general address was given. It was by Professor John McFadyean, the head of the Royal Veterinary College at Camden Town. He summarized Dr. Koch's theory as follows :—

- (1.) That human and bovine tuberculosis are not identical ;
- (2.) That human tuberculosis cannot be transmitted to cattle ;
- (3.) That the transmission of bovine tuberculosis to man is so rare that it is not necessary to take any precautions against it.

Professor McFadyean began by pointing out the unanimity of opinion on the identity of the two forms of disease, and upon the fact of their intercommunicability. He agreed with Dr. Koch that bovine tubercle bacilli were, as a rule, distinctly more virulent for cattle and other domesticated animals than human bacilli, and that the results of experiments indicated that in natural circumstances there was little danger of cattle becoming infected from human beings. But Professor McFadyean joined issue with Dr. Koch on his other postulate, viz., the rarity of the transmission of bovine tuberculosis to man. He reminded the congress that the majority of disease-exciting bacteria were harmful to only one or two species, but all those that were common to all the domesticated animals were also pathogenic to man.

The only proposition in Dr. Koch's argument that was really germane to the point at issue was that only cases of primary intestinal tuberculosis could possibly have had their origin in infected milk or meat, and that 'such cases were extremely rare.' If all the statistics relating to this point were unanimous, it would have to be admitted that primary intestinal tuberculosis was rare in the human subject, and that cases of infection through milk were still rarer, though even then it might be advisable to take steps to prevent the few cases. But the statistics were by no means unanimous, and those that were likely to appeal with most force to the people of England were not at all in accord with those quoted from Germany. During the last few years the evidence obtainable from the post-mortem records of two of the largest hospitals for children in Great Britain had been analysed with great care, to see what evidence they afforded as to the relative frequency of the different methods of infection in tuberculosis.

In the case of the Royal Hospital for Sick Children in Great Ormond Street, this had been done by Dr. George Still, and in the case of the Royal Hospital for Sick Children, in Edinburgh, by Dr. Shennan. The conclusion at which Dr. Still arrived was that in 29·1 per cent of the cases of tuberculosis in children primary infection appeared to have taken place through the intestines. That was very far from being an insignificant proportion, and it was a striking fact that Dr. Shennan arrived at an almost identical conclusion, and estimated that 28·1 per cent of the cases of tuberculosis among children in Edinburgh were due to alimentary infection. In face of these statistics it was not possible to assent to the statement that cases of primary tuberculosis of the alimentary canal were extremely rare. Precisely the contrary conclusion was the one that must, in the meanwhile, be drawn with regard to the state of affairs in Great Britain, viz., that at least in children primary infection of the alimentary canal was comparatively common. Professor McFadyean proceeded to examine very carefully the danger through the sale of milk, quoting the late Sir Richard Thorne, to the effect that the loss of child life through the use of tuberculous milk was 'appalling,' and summing up his conclusions on the whole case in the following passage :

The danger cannot be defined by stating how many persons are thus infected annually, or what fraction the persons thus infected form of the total number who contract tuberculosis in the course of a year. At the same time, it is impossible to doubt that the danger is a very real one, since at the present time milk is a vehicle by which tubercle bacilli are often introduced into the bodies of human beings.

Professor McFadyean then dealt with the means of averting the danger, maintaining that the ideal method of counteracting this source of human disease would be to

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stamp out living tuberculosis, or to prevent the sale of milk from every cow that was tuberculous.

And he ended his address with the following words:—

‘In conclusion I would venture to express the earnest hope that the congress will not endorse the view that it is inadvisable to take any measures to prevent the transmission of tuberculosis from the lower animals to human beings. To justify the introduction of measures to that end it is not necessary to contend that this is a common method of infection or that the danger arising from milk can for a moment be compared with that present in human sputum. The inhalation of tubercle bacilli expelled from the bodies of human patients is doubtless the great cause of human tuberculosis, and every practicable means of preventing infection in that way ought to be employed ; but, at the same time, we ought not to concede to the milkmen the right to sell us tubercle bacilli, even if we were assured that—like Dr. Koch’s experimental pigs—we had nothing to fear beyond the development of little nodules here and there in the lymphatic glands of our necks and a few gray tubercles in our lungs.’

Professor Virchow in an interview reported from Berlin, under date July 26, says he has for years fought against the idea of the hereditary transmission of tuberculosis. He disagrees, however, with Professor Koch’s deductions with regard to bovine tuberculosis and its transmission to man. Professor Koch, Dr. Virchow says, has quite ignored the investigations of the Copenhagen school and the results they have obtained.

It will be clearly seen from the foregoing that the position of all these eminent authorities who criticised Dr. Koch’s announcement was essentially uniform.

They deprecated a hasty conclusion, on inadequate evidence, and gave weighty reasons for differing from Dr. Koch ; they pleaded for further investigation, and urged the continuance of the present preventive measures until the issue has been decided. There is no doubt that this is the wise course to adopt. Professor Koch would, probably, say the same himself. In fact, he suggested that his experiments should be repeated in order that all doubt might be removed. It seemed to be generally considered a pity that he has given this marked publicity to theories of such importance while any doubt remains.

Meanwhile is it unreasonable to take the position that presumption should be against the consumption of milk from other than healthy cows, and that meat and milk plus disease products, tubercle bacilli, or what not, is not of the quality and nature reasonably expected by the purchaser from the vendor, or that we desire to use and to give to our children ; and that while doubt exists no relaxation of measures directed towards ensuring its purity should be permitted ?

Science will achieve a useful work if she imbues us with a wholesome dread of tuberculous meat and milk and other harmful food, although it may be that tuberculous food has in no case set up tubercle in any healthy person. Pasteur, in studying the diseased silkworms, traced the evil to a microbe, but far the more valuable and suggestive outcome of his researches was the discovery that so long as the silkworms were in health they laughed and waxed fat on the microbe. Only when they deteriorated in condition and suffered from digestive derangement could the microbe enter in and devastate them.

Professor Koch’s failure to induce tuberculosis in healthy animals by means of feeding them on a tuberculous diet is only another illustration of the fact that health is a weapon whereby the microbe, whether of tuberculosis, of diphtheria, or of any other disease, can be successively combated. The indication and the duty of modern science, therefore, is to raise by all possible ways of sanitation, legislation, and by the spread of knowledge, the standard of health.

Other matters of importance that engaged the attention of the congress were the questions relating to the claim for notification of phthisis, and for power to compel the disinfection of infected houses and articles ; the proposals for public aid not only for the tubercular breadwinner himself but for those non-infected persons who are dependent upon him ; consumption hospitals ; and sanatoria.

With regard to consumption hospitals and special consumption wards in general hospitals it was urged that if only a considerable fraction of the whole number of consumptives were suitably lodged in this way, a diminution of infection and consequently of the sum total of tuberculosis could not fail to be the result.

In regard to the modern sanatorium, Koch allows that by careful selection of cases it will be possible, if the duration of treatment be prolonged, to cure 50 per cent of patients, or perhaps still more. The total effect, however, he is convinced, will always remain moderate. Be this as it may, it must in fairness be remembered that it is largely owing to the sanatorium movement that the present great international interest in the tuberculosis question has arisen. To the managers of private sanatoria, though they have by some been slightly compared to hotel-keepers or hotel managers, is due much of the credit for the great advances which have been made during recent years in our knowledge of the whole subject of the treatment of consumption. In the struggle against tuberculosis the importance of improving the general health of weakly children of the poorer classes by the establishment of charitable seaside sanatoria and holiday colonies, as referred to by Professor Brouardel and Sir Hermann Weber, cannot be overlooked. This is indeed a timely method for rendering the human soil unsuitable to the bacillary growth.

As a delegate representing Canada, in an address before the State Section of the Congress, I spoke of the present conditions in the Dominion as to tuberculosis, and the measures being taken towards its prevention and cure. I drew attention to the fact that these measures—until recently only the action of boards of health, of medical societies, of comparatively small associations, and of individuals—have this year been widened and extended into a great national movement by the action of Lord Minto, His Excellency the Governor General, in organizing and setting in motion the Canadian Association for the Prevention of Tuberculosis, of which he is the Honorary President.

I referred to the sanatoria already in existence and at work amongst us ; and to the recent legislation of some of our provinces towards the establishment of provincial and municipal sanatoria. And I pointed out how admirably our climate, with its dryness and clearness of atmosphere, is adapted for that open air treatment which is now universally admitted to be the most important factor in the hoped-for cure of this disease.

The final meeting of the congress was held on July 26, with the Earl of Derby in the chair. The following resolutions were unanimously adopted :—

1. Tuberculous sputum is the main agent for the conveyance of the virus of tuberculosis from man to man. Indiscriminate spitting should therefore be suppressed.

2. All hospitals and dispensaries should present every out-patient with a leaflet on the prevention of consumption and insist on the use of a pocket spittoon.

3. Notification of tuberculosis should be established, when possible. If compulsory notification is impracticable, voluntary should be encouraged.

4. The provision of sanatoria is an indispensable part of measures for the diminution of tuberculosis.

5. Medical officers of health should use all their powers and relax no effort to prevent the spread of tuberculosis by milk and meat.

6. In view of the doubts thrown on the identity of human and bovine tuberculosis, the government is requested to institute an inquiry into the subject.

7. The educational efforts of the great national societies for the prevention of tuberculosis are deserving of support.

8. A permanent international committee should be appointed to report on the measures for the prevention of tuberculosis in different countries.

9. Overcrowding and defective ventilation, damp and unsanitary dwellings of the working classes diminish the chances of curing consumption, and are predisposing causes of the disease.

10. The attention of governments and charitable persons should be called to the necessity for establishing anti-tuberculous dispensaries.

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Under orders from the Minister of Agriculture to the Hygienic Institute of the Berlin Veterinary College, the head thereof, Ostertag (*Zeitschrift für Fleisch und Milchhygiene*, ix., pp. 168 and 221), undertook an investigation of the virulence and specific bacterial content of milk of cows, which, though reacting to tuberculin, show no clinical evidence of tuberculosis. Separate samples and the mixed milk of fifty cows were tested by bacteriological examination, intraperitoneal inoculation of cream sediment, and feeding experiments with guinea-pigs, of which animals during the inquiry no less than 526 were used. Individual samples from forty-nine cows, which simply reacted to tuberculin, yielded no bacilli. From his results Ostertag concludes that the mixed milk of larger herds, which react without clinical evidence of the disease, may by chance contain bacilli without being able to any noteworthy extent to produce tuberculosis by ingestion; and, further, that the milk of cows which give no clinical evidence may be considered as quite harmless. But with the milk of those with affected udders, and of those which have become emaciated, the case is quite different. In no secretion of tuberculous cows are the bacilli so numerous as in that of the tuberculous udder. The most important measure for the prevention of dissemination of tuberculosis through the agency of milk is the weeding out of all cows with involved udders and of those which show emaciation, and this should be done by fortnightly veterinary examination.

After the statements made by Professor Koch at the British Congress on Tuberculosis, it was generally felt that it would be necessary to have another commission appointed to inquire further into the question of the transmissibility of the disease from animals to man, and from man to cattle. Such a commission has now been appointed, Sir Michael Foster, Professor G. Sims Woodhead, Dr. Sidney Martin, Professor John McFadyean, and Professor Robert Boyce being the Commissioners.

Hydrocyanic Acid in Public Health Work.—Drs. Fulton and Stokes have published the following accounts of their investigations of this agent as a disinfectant :—

Under the same conditions as are practically obtained in room disinfection with formaldehyde, non-sporulating bacteria are destroyed by twenty-four hours exposure to hydrocyanic acid gas in amounts equivalent to one gramme of potassium cyanide to each cubic foot of inclosed space.

Hydrocyanic acid is not, however, so useful a gaseous germicide as formaldehyde, being at present much more expensive, far more dangerous and no more effective. Its single advantage is that it may be generated without fire.

The gas is obtained by treating cyanide of potassium with a dilute mineral acid in a stone vessel. Our working formula is :

Potassium cyanide.....	1.
Concentrated sulphuric acid..	1.5
Water..	2.25

The acid is first diluted after which the cyanide may be dropped into the acid. By this method the evolution of gas is very rapid, so that we prefer to deliver the dilute acid through a siphon into another earthen jar containing the cyanide.

Its destructiveness of all forms of animal life recommends hydrocyanic acid, especially for ship disinfection in the prophylaxis of bubonic plague, yellow fever and the diseases conveyed by animals and insects.

It is a highly diffusible gas ; having a specific gravity of .935.

Guaiaecum paper wet with 2 per cent solution of cupric sulphate inclosed in test tubes tightly plugged with cotton and exposed in a room to the gas in amounts equivalent to one gramme of cyanide to three cubic feet of space, showed that the gas, generated by the siphon method, could penetrate by diffusion three inches of cotton in five minutes, and nine inches of cotton in twenty-nine minutes.

All animals and insects exposed without protection are destroyed within five minutes.

Insects protected by inclosure in cotton plugged tubes were killed in periods of time varying directly with the depth of the cotton plugs.

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Thus roaches were killed in tubes under one inch of cotton within ten minutes, and under nine inches of cotton within one hour.

As compared with roaches, more time is required to kill bed-bugs, ticks and ants, while flies and mosquitoes succumb earlier.

Higher animals, as guinea pigs, rats and mice, are overcome more quickly than insects.

Our notes show that one rat recovered after ten minutes' exposure. By the siphon method, these animals, if unprotected by covering, are overcome within sixty seconds, and are, as a rule, dead within ten minutes.

Our notes show that one rat recovered after ten minutes exposure. By the siphon method the gas may be generated without danger to the operator. Milk, bread and butter exposed to the gas in amounts as high as one gramme of cyanide to the cubic foot do not become poisonous.

The gas has no injurious action upon wood, metals, textile fabrics or paint.

The gas while extremely dangerous, if carelessly handled, is by no means unmanageable.

Disinfection at the Port of Departure.—Since my last annual report this has been put into practice at Hong Kong, under the supervision of the medical officer of the United States Marine Hospital service for vessels for the Pacific ports of the United States. In Public Health Reports of December 28 last the following is reported to the surgeon general by Dr. Kerr of the United States Marine Hospital service who is on duty at Hong Kong :

'The new floating plant was used for the first time, the crews and steerage passengers of two vessels being treated there during the week. The barge, formerly an old sailing ship, is fitted up with a steam chamber 12 feet long and 5 feet in diameter, inside measurement. The chamber, boilers, and bath-room are located between decks, thus leaving the entire upper deck space for the unpacking of baggage. The chamber did very good work, the pressure in the jacket being 40 pounds and in the chamber 20 pounds. Having no provision for obtaining a vacuum, it is necessary to dry the clothing before its removal from the chamber. The sulphur rooms are not yet completed, but they will soon be built on the upper deck. The plant is in charge of Chinese attendants, one of them being recommended to the company by this consulate. This man is directly responsible to the consulate for the character of the work.

'The sulphur room at the Pacific Mail Company's disinfecting station is about completed, and the baggage leaving on the next steamer for San Francisco will be treated there.'

I may here perhaps be permitted to quote a short paragraph from my longer article on this subject of disinfection, &c., at the ports of departure in my annual report for 1897: 'I am, as ever, strongly of opinion that the proper time and place for the routine disinfection of passengers and their effects, and for their vaccination, are before they board the vessel, and at the port of departure. This properly carried out would destroy any infection many days sooner ; would lessen the chance of disease during the voyage ; would lessen the risk to cabin passengers of contracting disease from the steerage ; and if properly certified to might well replace any routine disinfection of healthy vessels—even during epidemics—at quarantine, and so greatly lessen interference with travel and traffic, limiting our quarantine to inspection, and the treatment of actual infection only.'

National Hygienic Laboratories.—By an Act which passed the Congress of the United States, on March 3 last an appropriation of (\$35,000), thirty-five thousand dollars was devoted to the establishment of a national hygienic laboratory at Washington. A subsequent Act (July 1, 1901), provided for the establishment of government laboratories for the Philippine Islands, the opening sections of the Act are as follows:—

Section 1. A biological laboratory, a chemical laboratory, and laboratories for the production of vaccine virus and of serums and prophylactics shall be established and maintained by the government of the Philippine Islands.

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Section 2. The biological laboratory shall be situated at Manilla, and shall afford adequate facilities for investigation into, and scientific report upon, the causes, pathology, and methods of diagnosing and combating the diseases of man and of domesticated animals, and of animals utilized for food, and of plants useful to man, as well as for such other biological work as may be deemed necessary by the board of health for the Philippine Islands, the forestry bureau, the bureau of agriculture, or any other department or bureau of the government.

Section 3. The chemical laboratory shall be situated at Manilla, and shall afford adequate facilities for investigation and report as to the purity of foods and drinks ; as to the composition and properties of gums, resins, drugs, herbs, or other plant products of known or supposed commercial value ; as to soils or fertilizers ; as to the minerals and minero-medicinal waters of the Philippine Islands, and for such other chemical investigation as may be deemed necessary by the board of health for the Philippine Islands, the department of public instruction, the forestry bureau, the mining bureau, the bureau of agriculture, the customs service, or any other department or bureau of the government.

Section 4. Laboratories for the production of vaccine virus and of serums and prophylactics shall be established and maintained at Manilla and at such other points in the archipelago as the board of health for the Philippine Islands may advise and the central legislative body of the islands may determine upon.

I would respectfully but most earnestly recommend to your favourable consideration the desirability of similar action by Canada to establish a National Hygienic Laboratory at Ottawa. I have referred to this matter above in my remarks upon vaccine against small-pox. To such a national laboratory suspected samples of various kinds could be sent from the different quarantines for the confirmation, modification, &c., of the opinions of the local officers, and definite instructions based on the certain evidence so obtained be wired for the treatment of the vessel, &c., in question. In it vaccines and prophylactic and curative fluids and serums could be prepared and be ready at all times to meet the demand, vaccine, tuberculine, Haffkine's plague-fluid, the serums and anti-toxins for diphtheria, cholera, plague, anthrax, glanders, rabies, &c.

Moreover, this country could then advance from its present position of entire dependence upon others for all information in such directions, and could take a place, worthy of itself and of its great destinies, in original research under governmental control towards the advancement of science, and the consequent benefit of mankind.

Congresses and Meetings.—In addition to my attendance at the British Congress on Tuberculosis as above reported I had the honour to represent the government of Canada at the meeting of the Canadian Medical Association at Winnipeg, August 28-31, and at that of the American Public Health Association at Buffalo, September 16-21.

THE QUARANTINE STATIONS.

Grosse Isle, Que.—At Grosse Isle in the St. Lawrence, and at its substation of Rimouski, 438 vessels have been inspected this year, 407 at Grosse Isle and 31 at Rimouski.

The admissions to hospital were 134; the diseases for which they were admitted were small-pox, scarlet fever, enteric fever, diphtheria, measles and chicken-pox. There have been four deaths : one from small-pox, two from scarlet fever and one from measles. Dr. W. Aylen was appointed assistant medical health officer, vice Dr. Church.

William Head, B.C.—Number of vessels inspected 488. Owing to the threatening of bubonic plague from San Francisco, and of small-pox from the United States generally vessels from San Francisco and United States ports north of it were not of

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late excepted from the quarantine regulations. This has increased this year the number of inspections at the three maritime British Columbia inspection stations, William Head, Victoria and Vancouver. Dr. W. H. K. Anderson was appointed as assistant medical officer and bacteriologist at the station in December, 1900. His services are reported by Dr. Watt to have been of great value. Five cases of small-pox were amongst the hospital admissions.

Victoria, B.C.—Number of vessels inspected 1,161.

Vancouver, B.C.—Vessels inspected 471. Disease found, measles. From 50 to 200 tons of Chinese foodstuffs packed in loam or clay arriving in each steamer of the Canadian Pacific Railway Company from plague infected districts have been disinfected at this station.

Halifax, N.S.—Vessels inspected 311. Admissions to hospitals were 11 for enteric fever, 9 for measles, and 21 for small-pox; 4 deaths from small-pox. The small-pox cases were amongst the crews of fishing schooners from Gloucester, Mass.

St. John, N.B.—Vessels inspected 274. The boring for an artesian water supply for this station has had to be abandoned owing to the entrance of sea water at a depth of 609 feet.

Sydney, C.B.—Vessels inspected 119.

Charlottetown, P.E.I.—Vessels inspected 10.

Chatham, N.B.—Vessels inspected 92.

Extra ports and places.—In addition to these regular stations you have this year given the country the additional protection of extra inspecting officers at the following points where from the lack of efficient health organizations to the south of them the importation of small-pox seemed most to be feared. In British Columbia, Log Cabin (on the White Pass to protect northern British Columbia and the Yukon Territory). Huntington, Grand Forks, Carson, Cascade, White's Camp, Rossland and Nelson, from Northport, Kettle River district, Midway, Cheesaw, Rykerts and the Tobacco Plains trails. In the North-west Territories: Coutts and North Portal. In Manitoba: Deloraine, Boissevain, Killarney, Crystal City, Morden, Gretna, Emerson and Sprague; in Ontario: Beaver Mills, Mine Centre, Fort William, Port Arthur, Sault Ste. Marie, Bruce Mines, Thessalon, Collingwood, Owen Sound, Chippewa, Erieau and Rondeau Harbour; in Nova Scotia: Digby, Weymouth, Bear River and Clementsport and Yarmouth; in Cape Breton: Louisbourg. Also at the port of Charlottetown inspections have been authorized of arrivals from Pictou where small-pox occurred. Prince Edward Island is guaranteed quarantine protection even against her sister provinces by the terms of union.

While not expecting or hoping to be able to keep out a disease with a period of incubation of about two weeks as small-pox has, and especially this mild type of that disease which does not as a rule prevent the patient from moving freely from place to place, these extra precautions have done great good. Actual cases of the disease have been kept from entering, the exposed have been protected by vaccination, and the knowledge of the inspection has caused countless travellers from the United States to be vaccinated before leaving for Canada. In these ways great good has been done with a minimum interference with travel and traffic.

The Territories.—In the beginning of April of this year the sanitary administration of the Territories was transferred to you by the Hon. the Minister of the Interior. To take immediate measures for the control of the small-pox outbreak reported from the Edmonton district Dr. James Patterson, of Winnipeg, was at once despatched thither. A little later he was directed to proceed to Regina as the representative of the Public Health Branch of this department, and from thence to take the necessary

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measures for controlling and stamping out the various outbreaks of small-pox throughout the North-west Territories, acting in harmony with the North-west government and under its Public Health Ordinance.

Dr. Patterson reported that he found practically all of those born in the North-west Territories during the last twenty years and many others to be unvaccinated, and that some general system had to be adopted at once as the most efficient preventive. The school boards of trustees were the only organized bodies through which this could be accomplished. There are nearly 700 of them. Dr. Patterson advised that each child should produce a certificate or other adequate proof of successful vaccination before being admitted to school after the midsummer holidays. The school ordinance was amended in this particular. Dr. Patterson then had a circular sent to each secretary-treasurer of the school boards, offering vaccine free of cost, sufficient to vaccinate all the unprotected school children and all others under or over school age in the district if the board of trustees would see that it was honestly used. This offer was promptly and willingly accepted and requisitions poured in for over 30,000 tubes.

Since the first outbreak of this disease last winter cases of it have occurred in the following places and districts in the North-west Territories :—

Pincher Creek, Lac Ste. Anne, Cochrane, Edmonton, Touchwood Hills, Cannington Manor, Carlyle, St. Paul de Metis, Macleod, Lethbridge, Onion Lake, Maple Creek, Battleford, Cottonwood, Athabasca Landing, Cardston, Ponoka, Calgary, Regina, Moosejaw, Innisfail and Port Ellice.

Thanks, however, to the energetic and well devised action of Dr. Patterson, aided by the various medical assistants under him the small-pox has been all but extinguished throughout these Territories. Dr. Patterson knows of no cases now except one little bunch north of Edmonton, near the crossing of the Sturgeon, on the Athabasca Landing trail. There it is confined to four families living in three houses close together, and at a distance of about two miles from nearest neighbours. All half-breeds, seventeen individuals, of whom fifteen have had the disease. They are under care of a guard to keep them at home. Dr. Patterson thinks that about November 10 they will be in a condition to be disinfected and set at liberty. A medical man is to go out from Edmonton at that date and see this done.

Public Works Health Act.—Mr. Charles A. L. Fisher, the inspector under this Act has made official visits to the various canals, railways, mines and works of other public companies covered by section 1 of the Act, and coming within the legislative authority of the parliament of Canada. As you will see by his report Mr. Fisher calls attention to the excellent health and condition of all classes of employees on the public works thus coming under your sanitary control. And speaks of the satisfaction expressed by many of them at the passing of this Act, and the enforcing of the Public Health Regulations under it. He states moreover that contractors, railway managers and those in charge of other public works, are taking an interest in the carrying out of the regulations, seeing the advantages gained therefrom.

Tracadie Lazaretto, N.B.—Four of the leper inmates of this establishment died during the year. Two new cases were admitted, both from the district of Shippegan, N.B. The present number of patients is 18, 11 male and 7 female. Dr. Smith reports continued beneficial results in those who persevered in the use of chaulmoögra oil internally with that of creolin externally.

I have the honour to be, sir,

Your obedient servant,

F. MONTIZAMBERT, M.D.Edin., F.R.C.S., D.C.L.,

Director General of Public Health.

The Honourable

The Minister of Agriculture,
Ottawa.

No .2.

(G. E. MARTINEAU, M.D.)

OFFICE OF THE MEDICAL SUPERINTENDENT,
GROSSE ISLE, QUE., October 31, 1901.

SIR,—I have the honour to submit my annual report of the St. Lawrence Quarantine Service to October 31, 1901.

Four hundred and seven vessels were inspected at this station during the present year, being an increase of thirty-three over the last year.

The total number of persons examined was 40,270; divided as follows : 2,437 cabin, 3,831 intermediate, 13,998 steerage passengers and 20,004 crew.

Infectious diseases were reported by or found on board the following vessels arriving in the St. Lawrence, named in the order of their arrival : SS. *Lake Superior*, *Tunisian*, *Lake Megantic*, *Brazilian*, *Lake Champlain*, *Australasian*, *Numidian*, *Sarmatian*, *Kastalia*, *Lake Simcoe*, *Lake Ontario*, *Lake Manitoba* and *Parisian*. The diseases so reported and discovered were: small-pox, scarlet fever, enteric fever, diphtheria, measles and chicken-pox. All those sick were removed with attendants to the hospital at Quarantine, and the vessels proceeded after having had their hospital disinfected.

Small-pox.—SS. *Lake Superior*, Evans, master, having sailed from Liverpool on April 30, with 109 intermediate and 614 steerage passengers, 27 cattlemen and 107 crew, arrived at the station on May 10, at 10 a.m., with one case of small-pox on board, which had developed four days previous, amongst one of the steerage passengers.

Having made a careful inspection of the rest of passengers that we found all well, we removed the patient to the small-pox hospital, and the steamer having been anchored near the station we began immediately the landing of the passengers and of their baggage.

The vaccination began on the 11th and was terminated on the 13th.

The disinfection of baggages, cloth, bedding, &c., with steam disinfector and formaldehyde; and the antiseptic baths took place on the 13th, 14th and 15th.

The disinfection of the steamer began on the 11th and was terminated on the 17th, the methods employed being steam, formaldehyde, mercuric chloride solution and sulphur dioxide gas under pressure.

On the 18th a new crew having been sent down from Quebec with tug *Hackett*, took charge of the vessel which had been placed in the offing without any one on board.

The unloading and loading of the steamer's cargo having been completed before the expiration of the period of observation of the old crew, the vessel came down to the station on the 21st in charge of the same crew who had taken her up, and the same precautions were taken when exchanging the crews as on the 18th ; no one of the old crew went on board before all the other crew going up to Quebec with tug *Hackett* had left the steamer.

The passengers and the rest of the crew detained at the quarantine as suspicious, were released after a careful inspection and left the station on May 25 and 26.

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The only case of small-pox that we had removed from that vessel and isolated in the small-pox hospital, died of infectious endocarditis (complication of small-pox) on May 17.

On May 31 one of the employees at the station, Captain Couillard, came at my office on official business, and having remarked then that he had some rash on the face. I asked him if he was sick, he replied that he was not feeling sick at all, that he was as usual eating and sleeping well and having no pain whatever ; but that he had had an overheating some days previous and this was probably the cause of that rash, nevertheless, I took his temperature and having found that he had 102° Far., I sent him down to the hospital for observation, and on June 2 next, the rash having increased considerably and showing all the evidences like, I could diagnose then that he had small-pox.

Every precaution were taken in order to prevent the spread of the disease amongst the other people at the station, and no other cases occurred.

Captain Couillard has fully recovered and he was discharged from the hospital at quarantine on July 30.

This year has been a very busy one at the station, we have had from twenty to thirty patients at the same time in the hospital during all the season, and the total number of persons admitted to the hospital was 134.

The deaths numbered four, one from small-pox, two from scarlet fever and one from measles.

Three steerage passengers were landed from ss. *Numidian* on September 1 on account of having refused to be vaccinated, and they were detained at the quarantine for the usual period of observation.

Bubonic Plague.—SS. *Indian* from Algoa Bay, an infected port, arrived at the station during the night and was detained for inspection at day-light ; everybody on board was well.

Quarantine Staff.—The Rimouski substation continued to be in charge of Dr. A. Lapointe, who made the inspection of the weekly mail steamers. I visited this advance port, and, coming up from thence on the mail steamers, made a detailed inspection between Rimouski and Grosse Isle.

Improvements and Requirements.—I may perhaps be permitted to express here my satisfaction for the great number of works and improvements done at the station during the present year.

Reserve Inspecting Steamer.—I beg leave respectfully to suggest again this year that a new strong steamer with screw be built or purchased, because it is very difficult and dangerous to come alongside the steamers in rough weather and seas with a paddle boat such as *Kathleen*. This new boat should be certainly for the best interest of the station as well as of all those concerned.

Deep Water Wharf.—The fire took by spontaneous combustion into the coal at the upper wharf and caused great damage. The burned coal and the stone which fell from the wharf have diminished the depth of water at that place and rendered it very dangerous for our boats at low water. Since a long time a deep water wharf has been asked, and I think it should be the proper time to lengthen that wharf which should be very convenient to give a shelter to our boats in rough weathers and seas, and to which the infected vessels could be brought to land the passengers and the baggage, &c.

Steam Laundrying Disinfecting Apparatus.—The great deficiency for the hospital continues to be that of one steam laundrying disinfecting apparatus to sterilize the contaminated linen, clothes, bedding, &c., belonging and having served to the sick and attendants in the hospital.

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When these three additional appliances (strong reserve inspecting steamer, deep water wharf and steam laundrying disinfecting apparatus for the hospital) will be granted and completed, it will bring Grosse Isle into the foremost rank of quarantine stations of the first-class.

Some other works and repairs are also necessary, the list for which is in the hands of the Public Works Department.

All of which is respectfully submitted.

I have the honour to be, sir,

Your obedient servant,

G. E. MARTINEAU, M.D.,

Medical Superintendent St. Lawrence Quarantine Service.

The Honourable

The Minister of Agriculture,
Ottawa.

No. 3.

(N. E. MacKAY, M.D.)

HALIFAX, N.S., October 31, 1901.

SIR,—I have the honour to submit my annual report of the quarantine station at Halifax, for the year ending October 31, 1901.

The arrival of the troopships *Idaho* and *Roslyn Castle* from Cape Town, South Africa, with the returning Canadian contingents, added more than usual interest to the work of the station during the past year. The former arrived in port on November 1, 1900, with 547 souls on board—all well—and the latter on January 8, 1901, with 933. Two deaths occurred on the voyage from enteric fever and eight were sick with the same disease when the vessel arrived in port.

During the year 311 vessels were inspected—18 less than the previous year. In the same period we examined 2,124 cabin passengers, 2,173 intermediate, 17,078 steerage and 11,237 crew. A total of 30,438 souls.

Minor quarantinable diseases were found on board the following vessels:—SS. *Corinthian*, November 26, 1900; one case of enteric fever. SS. *Parisian*, December 6, one case of enteric fever; ss. *Roslyn Castle*, January 8, 1901, eight cases of enteric fever. SS. *Numidian*, from Liverpool, March 8, one case of enteric fever; ss. *Lake Champlain*, from Liverpool, March 16, two cases of measles; ss. *Lake Superior*, from Liverpool, March 28, scarlet fever (child died as vessel was entering the harbour); ss. *Lake Ontario*, from Liverpool, April 4, seven cases of measles; ss. *Lucitania*, from Liverpool, April 12, one child died of measles on the voyage, and the ss. *Sicilian*, from Liverpool, June 5, five cases of measles.

The patients ex-*Parisian* and *Idaho* belonged to the returning contingents from South Africa were taken charge of by the military authorities, and treated in their hospital, and by request the patient ex-*Numidian* was allowed to proceed to Portland. The case ex-*Corinthian* was sent to the V. G. hospital for treatment.

Other diseases were found on the following vessels:—ss. *Vancouver*, November 17, seaman sick with pneumonia; ss. *Noura*, December 3, 1 case of phthisis; ss. *Lake Supe-*

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rior, January 13, 1 case of bronchitis; ss. *Numidian*, March 8, 1 case of pneumonia; ss. *Ulunda*, December 8, sailor sick with phthisis; ss. *Ethelhilda* from Antwerp, December 12, sailor with broken leg. All these were sent to the V. G. hospital for treatment.

Eleven deaths occurred on the voyages from various causes, viz. : 2 of enteric fever ; 1 of scarlet fever ; 1 of measles ; 1 of marasmus ; 1 lost overboard (drowning), and 4 from undetermined causes, but not contagious or infectious.

The seven (7) cases of measles ex-*Lake Ontario*, April 4, were sent to quarantine for treatment with the families to which they belonged—in all 21 persons. All the adults were Russian women. They were a very quarrelsome crowd. All the patients recovered.

The five orphan children, ex-*Sicilian*, June 5, were also treated at quarantine station. The oldest of them not being more than 9 years. I had to hire a nurse to look after them. And the two cases of measles ex-*Lake Champlain*, March 16, were allowed to proceed to St. John with the families to which they belonged. They were very mild cases.

With one exception, the apartments occupied on board the vessels by these people were disinfected by us with formaldehyde ; the exception was entrusted to the doctor of the ship.

The graver quarantinable disease, small-pox, was discovered on board three Gloucester fishing schooners, viz. : *Thalia*, *L. M. Goodwin* and *Essex*. The *Thalia* arrived from Liverpool, N.S., on September 10, with one of the crew sick with small-pox. The case at the time was in the suppurative stage. She had a crew of sixteen. All the well on board had been vaccinated in Liverpool a day or two before the vessel sailed for this port. None of those vaccinations took. The vessel and crew were at once sent to Lawlor's Island, and the crew bathed and their clothing and effects disinfected with hot steam at a temperature of 212 degrees F. for thirty minutes, and the ship with sulphur dioxide and mercuric chloride solution, 1 in 800. All the well were put in an isolated building under observation, and as soon as any of them exhibited febrile symptoms they were placed in a separate building and isolated there until unmistakable evidences of small-pox developed, when they were removed to the hospital. Ten of the crew contracted the disease, six only escaping.

After landing at the station the disease developed amongst the crew of the vessel on the following dates :—September 16th, 3 ; 18th, 1 ; 19th, 1 ; 20th, 1 ; 21st, 1 ; and 23rd, 2. In all 9.

The *L. M. Goodwin* arrived in port on September 20 from the fishing banks with two of the crew ill. They had all the symptoms of the primary fever of small-pox, but there was no sign of an eruption on either of them. However, on questioning the captain closely, I learned that he had landed two of his crew at Canso on September 7, with a peculiar rash, which the local doctor called scurvy. At the time, I was aware that two fellows belonging to an American fishing schooner had been landed at Canso, and had passed through the city and were quarantined at Meteghan, Digby County, for small-pox, so, I at once concluded that they (the sick) were suffering from the prodromal symptoms of small-pox, and ordered the vessel to quarantine. In two days after, the rash appeared. The vessel had twenty of a crew. They were all vaccinated at once and their clothing and effects were disinfected as was also the vessel in the usual manner. One of the crew developed the disease subsequently—September 24.

The schooner *Essex*, from the fishing banks, arrived on September 26 with one man laid up with small-pox. The disease was in the suppurative stage. The man contracted the disease at Canso from the crew of the *L. M. Goodwin*, on September 7. The vessel was sent to quarantine and the crew vaccinated and bathed and their clothing and effects, and also the vessel thoroughly disinfected. Seven of the crew developed the disease subsequently, as follows : 2 on October 4th ; 2 on October 5th, and 3 on the 7th.

The combined crews numbered 55 souls ; of these 21 contracted the disease, viz. : 10 of the crew of the *Thalia* ; 3 of the *L. M. Goodwin*, and 8 of the *Essex*.

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Fifty men were vaccinated, and of these 29 took on first vaccination. Four of the crew of the *Thalia* took ill with small-pox within four days of being vaccinated, and one of the *Essex* crew two days after vaccination. On second vaccination we had 14 takes. In a large number of cases the men had badly inflamed arms, with a deep round ulcer at point of inoculation. A large amount of exudation surrounded the ulcer, which was the size of a ten-cent piece ; it had well-defined edges and was fully $\frac{1}{4}$ inch in depth. The operation was performed with strict antiseptic precaution.

Eleven of the cases of small-pox were confluent ; two modified confluent and eight discrete ; four died—all confluent cases. Death was due in one case to broncho-pneumonia more than to small-pox. With two exceptions not one of the fifty-five had been successfully vaccinated before coming to the station. Mortality about 19 per cent.

The three crews were kept, so far as possible, separate, and each person as soon as he developed any suspicious symptoms was removed to an isolation building and kept there under observation till no doubts existed as to his having the disease. My object in keeping the crews apart was to expedite the release of each vessel, with the well patients of her crew at the expiration of the 21 days of quarantine.

The schooner *Thalia* with six of the crew was released from quarantine on the 2nd day of October ; the *L. M. Goodwin*, with sixteen of the crew, on the 13th, and the *Essex*, with nine of the crew, on the 21st. Each of the vessels was held in quarantine the usual period, 21 days, from date of last exposure. The men discharged were those who had been successfully vaccinated and did not contract the disease. All who developed the disease after reaching the station had it in their system before landing, and none contracted the disease after they had been successfully vaccinated and bathed and their effects disinfected. This demonstrates the efficacy of vaccination as a preventive of small-pox. It is difficult to say whether the vaccination of those who had the disease in incubation, modified the attack, several of them had the confluent type.

On October 23, we discharged 10 convalescent patients from the hospital, and on the same day released three of them from quarantine, and on the 30th the remaining seven. However, before discharging these they were repeatedly bathed in mercuric chloride solution, and were given a needle and shower bath the day they were released, and their clothing and effects were subjected to hot steam for thirty or forty minutes at a temperature of 212 degrees F. Seven patients remain in the hospital at this date. They are all progressing favourably and we hope to have quarantine raised by the middle of November.

When the disease broke out I had a good deal of trouble in getting suitable assistants, indeed I was obliged to take whatever help I could get. The first nurse I hired contracted the disease himself. When I employed him he represented to me that he had had the disease, but for fear he might be mistaken I had him vaccinated. This is the only person who contracted the disease at the station.

By permission the ss. *City of Ghent*, a local coasting steamer, which brought from Canso the two sailors, landed there by the *L. M. Goodwin* with small-pox was disinfected at the station on September 30, and also the crew and the effects. Disinfection was done at the expense of the owners and the city health board.

At one time we had three schooners and one steamer tied up to the wharf at the station for small-pox.

A number of galvanized iron beds arrived at quarantine recently for the use of the new detention building, but they have not yet been put in position.

During the past year a large concrete tank, with a capacity of 40,000 gallons, was constructed on the highest point on the island. This tank has been connected with all the buildings and is intended for flushing purposes.

The following improvements are absolutely necessary : The main wharf should be replanked, and the smaller one at eastern passage side of the island should be repaired, and also the boat-house. We need a coach-house and an ambulance, and two more surface wells—one in the vicinity of the hospital. The framework under the mercuric

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chloride tank has given way and needs immediate attention. It seems to me that it would be better to have the framework boarded in and shingled so as to protect it from the weather.

Since my last report the ss. *Argus* has been provided with a new boiler, and her machinery has been thoroughly overhauled and renewed. She is now in good repair.

The order recently issued by the department calling for the inspection of all vessels coming from United States ports north of New York, is being enforced as far as possible. A large majority of vessels from ports north of New York calling at this station are small sailing vessels, principally fishing crafts from Gloucester, and they do not, as a rule, take a pilot on board on entering the harbour, and neither do they display a quarantine signal. Most of them do not even carry a yellow flag, and often their arrival is not signalled at the station. Never, if they come in after dark. So that in spite of all we can do some of them get up to the wharfs before we know they are in the harbour. This is especially apt to happen when they come in at night.

The signalling of vessels entering the harbour during the year just closed has been every thing but satisfactory. Often the citadel could not tell us whether a vessel was local or foreign, and at night they often mistake a tug boat for a large steamer. We are seriously handicapped in our work by the indifference of the signal station.

I believe that the quarantine service of the port could be attended to more efficiently if all inspections were made in the day time—mail boats excepted.

I have the honour to be, sir,

Your obedient servant,

N. E. MacKAY, M.D., M.R.C.S.,

Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 4.

(H. RINDRESS, M.D.)

NORTH SYDNEY, October 31, 1901.

SIR,—I have the honour to submit my report for the year ended October 31, 1901. The total number of ships inspected for the quarantine year number 119, of which 81 were steamboats and 38 sailing vessels; 53 were cis-Atlantic and 66 trans-Atlantic.

Since receiving your instructions in reference to the inspecting of ships coming from ports north of New York, hitherto exempt from quarantine regulations, I may say, that the only difficulty encountered was due to the masters' ignorance of the new regulations, in consequence of which, they did not fly the yellow flag in entering port. I am, however, satisfied, by comparison of my reports with the customs' entries, that none of such ships escaped inspection.

Although small-pox has been so generally prevalent, I am pleased to say that no contagious or infectious disease was found on any ships entering this port.

A case has, however, developed in Sydney, the subject having come there, by rail, from St. Hyacinthe, Quebec. The disease manifested itself five days after his arrival. Since then another case has developed by contagion from the first. By your permis-

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sion these cases have been removed to the quarantine station here and are being treated by the Sydney authorities at the city's expense. Both of these cases, I am informed by the doctors in attendance, are very mild. The first is already convalescent. Every precaution is being taken to prevent the spread of the contagion.

The hospital buildings and caretaker's house have received some much needed repairs in the way of shingling and painting. The work of plumbing and sewerage, proposed by the department, is very much needed.

The boat service has been very satisfactory.

I have the honour to be, sir, your obedient servant,

HORACE RINDRESS, M.D.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 5.

(J. E. MARCH, M.D.)

QUARANTINE, ST. JOHN, N.B., October 31, 1901.

SIR,—I have the honour to submit my report for the year ended October 31, 1901.

During this period I have inspected two hundred and seventy-four vessels with crews aggregating five thousand one hundred and eleven, and carrying one thousand one hundred and ninety-eight passengers.

None of the graver quarantinable diseases were discovered on any of the vessels inspected.

As a precaution against the introduction of small-pox through this station five hundred and sixty persons were vaccinated, sixty baths were given, five hundred and fifty-nine articles of wearing apparel were submitted to steam disinfection, and several hundred miscellaneous articles were disinfected by exposure to the germicidal action of sulphur dioxide and watery vapour, or to formaldehyde gas.

As a precaution against plague, in addition to carefully carrying out the instructions which have been sent me, I disinfected one vessel (*Umberto I.*) to destroy all rats and vermin.

On January 19 I disinfected staterooms on the ss. *Lake Superior*, which had been occupied by a case of scarlet fever landed at Halifax ten days before.

On October 1 it was announced that a case of small-pox had been removed to the General Public Hospital from the schooner *Myra B.* On the authority of a telegram from the Director General of Public Health, I placed this vessel in quarantine. She had been in port ten days when the case occurred, and was loaded, cleared for Boston—whence she had come and was ready to sail. My efforts to prevent the spread of this disease among her crew were successful, and she was discharged from quarantine all well on October 22.

Since the withdrawal of your order exempting from inspection vessels from New York and ports to the north of it, and the receipt of instructions to inspect these vessels with a special view to the detection of small-pox on board of them, I have sought to give every sailor in this coasting fleet, passing through my hands, the protection

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against small-pox afforded by a successful vaccination ; and, in order to systematize and facilitate this work, I have resorted to the use of the coloured tickets with which you have supplied me. I have found that a brief explanation of the purpose of these tickets overcomes nearly all objections to vaccination. Special stress being laid upon the value of the scarlet ticket as a time-saver on arrival, captains of coasters, when signing a crew here, give preference to the men holding them. The men are therefore anxious to obtain them, willingly submit to vaccination and are prompt in having their pink tickets exchanged for scarlet ones as soon as the vaccination 'takes.' In order to prevent fraud, I date and initial each card issued and write the holder's name plainly across the back. The scheme is of particular value in dealing with coasters because men once employed in this fleet usually remain in it for years, and in the course of a season about ninety per cent of them would pass repeatedly under the observation of the quarantine officer. The same plan would work fairly well with the crews of transatlantic lines, but in the case of foreign sailing ships or tramp steamers which are seen but once in the course of a season it would be of little use.

An attempt was made during the year to secure an artesian water supply for this station. It unfortunately failed, however, owing to the entrance of sea water, and the boring was abandoned at a depth of six hundred and nine feet. The officers of the Department of Public Works are now considering a proposition to establish a system of surface drainage and filtration which has been submitted by Mr. Cowan, one of their engineers.

The heating apparatus for the new buildings which has been purchased and delivered here has not yet been set up.

The business of the port during the coming winter promises to be the largest in its history. Seven lines of trans-Atlantic steamships will make St. John their western terminus.

Two of them, the Allan and the Elder Dempster lines, are large carriers of steerage passengers. In the not improbable event of having to land three or four hundred immigrants here the wharf accommodation will be found to be altogether inadequate. I hope that during the coming year this difficulty, as well as the difficulty in regard to the supply of water, will be satisfactorily removed.

I have the honour to be, sir, your obedient servant.

J. E. MARCH, M.D.,

Quarantine Officer.

The Honourable

The Minister of Agriculture,
Ottawa.

No. 6.

(J. MACDONALD, M.D.)

CHATHAM, N.B., October 31, 1901.

SIR,—I have the honour to submit my report for the year ended October 31, 1901.

No disease of a contagious character was found on any of the vessels that arrived at the station during the past year.

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Ninety-two vessels were inspected since November 1, 1900. In addition to those inspected ten or twelve steamboats arrived that had touched at other ports in Canada and were not, in consequence, subject to quarantine regulations here.

Vessels inspected here arrived from the following countries, viz.: The United Kingdom, the United States, South Africa, Germany, Denmark, Italy, Sicily, Norway, Spain, France, Bermuda, Buenos Ayres and French Guiana.

Through your kindness in representing to the Department of Public Works the necessity for an adequate supply of good water for the quarantine station at Middle Island, the said department very kindly and promptly ordered a well to be bored and a good supply of excellent water was procured at a depth of 84 feet.

The hospital buildings are in good order. Mr. J. Currie, the efficient caretaker, has recently done considerable work in improving the ground around the hospital.

I have the honour to be, sir, your obedient servant,

J. MACDONALD,
Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 7.

(P. CONROY, M.D.)

CHARLOTTETOWN, P.E.I., October 31, 1901.

SIR,—I have the honour to submit my report respecting quarantine at this station during the year ended October 31, 1901.

The chief trade to this port during the past year has been from points north of New York.

There were ten arrivals from across the sea, all of which were carefully inspected and found free from infection.

Following recent instructions the inspection of all vessels from foreign ports has been strictly attended to.

I have the honour to be, sir, your obedient servant,

P. CONROY, M.D.,
Inspecting Physician.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 8.

REPORT ON WILLIAM HEAD QUARANTINE STATION.

(A. T. WATT, M.D.)

VICTORIA, B.C., October 31, 1901.

SIR,—I have the honour to submit this my report for the year ending October 31, 1901.

The number of vessels inspected has been greater than in any previous twelve months, but there was no occasion for detaining any vessel in quarantine. The number of vessels passed was 448. This is a greater number than was reported as inspected during the previous year at any other quarantine station in Canada, and is an indication of the growing importance of the William Head station.

Bubonic plague has continued to threaten the ports on this coast. During the spring and early summer the disease became epidemic in Hong Kong and other points in southern China. Cases were discovered on two steamers which had cleared from Hong Kong for Victoria. The R.M.S. *Empress of China* had two cases of plague developed amongst her steerage passengers. One sick Chinaman was landed in Shanghai and afterwards died of plague, and on arrival of the vessel at Nagasaki another case was discovered and landed at quarantine, where he afterwards died. The steamer was placed in quarantine at that station for ten days, where the energetic measures taken by the Japanese quarantine authorities and the ship's surgeon successfully prevented further development of the disease; so that it was possible to grant free pratique to the vessel on arrival here. For the next two months, while plague remained epidemic in Hong Kong, the Canadian Pacific Railway Company's steamers carried no Chinese steerage passengers. On the Nippon Yusen Kaisha ss. *Hiroshima Maru*, a case of plague was found in the person of one of the crew, between Hong Kong and Kelung, Formosa. The steamer was quarantined at the latter place, and afterwards proceeded to Japan, and was ready to leave for Victoria when the discovery was made that the rats on board the steamer were infected with plague bacilli. This steamer had sailed originally from Bombay, and there was more than a probability that the infected rats came on board at that port, and that the infection of the member of the crew was from this source, and not from exposure in Hong Kong. The discovery of the disease amongst the rats was made only in time to prevent the steamer leaving for Victoria. The following quotation from one of the Victoria papers sets forth some of the facts in this case: 'According to advices received by the *Empress*, the trouble which occasioned the *Hiroshima Maru* being placed in quarantine just as she was about to start for Victoria, was owing to the discovery of supposed pest bacilli in the blood of rats caught on board the liner. The steamship *Hiroshima Maru* arrived at Yokohama on the 3rd instant (August), but as no traces of pest could be discovered, despite the discovery of a pest patient while on the voyage from Hong Kong to Kelung, she was allowed to anchor at the pier ready to leave for Victoria and Seattle. Subsequently it happened that the blood taken from the rats and kept in the Yokohama harbour quarantine office for the purpose of study, was discovered to contain pest bacilli, which greatly surprised the quaran-

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tine officials. But as the *Hiroshima Maru* had already been admitted into the harbour, and as moreover the N. Y. K. Co. would be subject to serious inconvenience if the vessel were detained, a further examination was conducted, and the discovery of bacilli was confirmed, and all doubt dispelled. The discovery was reported to the Nippon Yusen Kaisha, and the steamer was sent to quarantine for ten days.' The voyage was afterwards cancelled. The danger from rats as carriers of plague is well shown by this instance.

A case of plague was removed from the U. S. transport *Kintuck* in Japan. The patient was a Chinese fireman brought from Hong Kong by the Pacific Mail Steamship Company's steamer *China*, and one of a crew of forty-seven to be transferred to the ss. *Kintuck*. The ss. *China* continued on her voyage to San Francisco, and arrived with all well on board. The passengers were, however, landed at the quarantine, and the ship disinfected. The *Kintuck* was put in quarantine at Nagasaki. No other case developed, and the vessel was allowed to clear for Port Townsend.

While possibly the case on the *Hiroshima Maru*, and in all probability the cases occurring on the other above-mentioned steamers, were the result of exposure to the disease on shore, infected rats undoubtedly were the cause of the outbreak of plague on the ss. *Carlisle City*, which arrived at San Diego from Hong Kong the latter part of June, having had six deaths from plague on board, the last day before reaching port. All were in good health on this vessel until twenty-one days out from Hong Kong, when a Chinaman died from what was thought to be opium poisoning; nine days later, and thirty days from Hong-Kong, the first undoubted death from plague happened. Considering the subsequent case, the death on the twenty-first day may be regarded as suspicious, but the length of time out from Hong-Kong was too long for incubation to have continued after exposure in that port. The outbreak must, therefore, be ascribed to the rats which were observed to be dying before any sickness occurred amongst the crew or passengers. Dr. W. W. McKay, quarantine officer at San Diego, states in his published report that it is his belief that the plague infection on board the ss. *Carlisle City* was due to rats. After showing the improbability of other modes of infection, he states that dead rats were noticed before the outbreak of the first case; that they were also found in places and conditions, after the ship reached quarantine, showing that death had occurred several days before, in one instance a dead rat being found in a bag of rice, decomposition having advanced so far as to plainly indicate the occurrence of death several days before the ship reached port. The significant fact is further made manifest that a number of rats got on board the vessel in Hong-Kong, as Dr. McKay was informed by the officers of the steamship that in loading this steamer from the lighters (Sampan), that 'not infrequently rats were carried aboard in packages.'

Steamers loading at Hong Kong and at other ports in China and Japan do not go alongside the wharf, but are loaded from the numerous sampans; the danger, therefore, of rats coming on board directly from the wharf as at other ports is absent. However, there remains the possibility that they get on board concealed in packages, as was evidently the way on the ss. *Carlisle City*, and it is with the object of bringing out this fact that I have referred particularly to the occurrence of the plague cases on that steamer.

I have noticed myself that boxes and baskets of bulbs and roots shipped from China and Japan are frequently gnawed into by rats. In some cases, this may have been done before they were shipped, although most of it is done, no doubt, by the ship rats. In either case, there is danger. In the former, the goods may be contaminated by infected rats, or such rats might remain in the packages either dead or alive; in the latter case, the ship rats might become infected, as the soil in which the articles are packed or which remain sticking to such products as yams, &c., must be looked upon as dangerous and liable to convey plague to the rats.

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By your orders, all Chinese and Japanese foodstuffs, bulbs, tubers, &c., subject to soil contamination, have been disinfected before being allowed a landing, unless such products have been accompanied by a certificate that they were from a part of the country in which there had been no plague. The precautions with regard to such products, which, in consequence of their edible nature, are certain to afford harbour to rats, might as a proper measure of safety be made more stringent before the to-be-looked-for recrudescence of plague occurs in Hong Kong next spring. The disinfection of all products liable to soil contamination might be insisted on before such are shipped, and all other boxes of foodstuffs should be given careful inspection for the purpose of ascertaining that no rats have gnawed into the boxes. In fact, if certain of these products were required to be shipped in earthenware jars or tin-lined cases, as is already, to a certain extent, done, it might not be too severe a requirement, considering the possible danger of the present way of shipping.

Cases of plague have continued to occur in San Francisco. During the last twelve months there have been thirty-one known cases. No rats have so far been discovered to be infected with the plague bacilli, and to this fact may be attributed perhaps the little headway the disease seems to be making in Chinatown. There is no doubt that many conditions are against the spread of the disease in San Francisco, as compared with the conditions prevailing in the unsanitary cities of China, but a severe outbreak is quite within the province of possibility. The nature of the disease in San Francisco is now no longer disputed. A commission of eminent bacteriologists, appointed by the United States government, spent some weeks studying the disease, and settled the fact beyond all doubt, that it was true plague. Since then all the authorities concerned have been working in harmony, and making a strong endeavour to stamp out the disease.

In Honolulu there was a slight recrudescence of the disease during the summer, but only half a dozen cases were reported. Some rats were found from which the plague bacillus was isolated. Cases of the disease have continued to appear in Australia, more particularly in Brisbane. Besides numerous epidemic foci in China, the disease has been present to a slight extent in the Philippines and Japan. From all the places mentioned, regular communication by steam and sailing vessels is had with British Columbia. These vessels have been carefully inspected, and where deemed necessary, baggage and effects of steerage passengers and Asiatic crew have been disinfected, and the people bathed; 4,178 steerage passengers were bathed, and 3,568 persons belonging to crew. This is less than one-third the number so treated in the previous year, but since the 9th of February, none of the steamers belonging to the N. Y. K. or N. P. companies have been disinfected at this station. Since that date the disinfection carried out before the passengers embark in Hong Kong or Japan has, by your authority, been accepted in lieu of the formerly-required disinfection at this station. This work has been under the supervision of the United States sanitary officers, and is being carried out at the expense of the steamship companies. Another fact which accounts for the smaller number treated, is that the Japanese immigration has practically ceased, owing to restrictions imposed by the Japanese government. And, too, the flow of Chinese immigration was stopped for some time, as the Canadian Pacific Railway steamers refused to carry Chinese after the *Empress of China* was quarantined in Japan on account of plague.

In connection with the plague, an incident that happened in Japan deserves mention. This was the discovery of plague bacilli in the blood of rats caught for experimental purposes in buildings belonging to the Imperial University at Tokio. It was, therefore, unwittingly found that some one had been careless in the laboratory of the university, and great excitement was caused. A bounty was at once put upon rats and war waged against them. But no others were found infected, and no cases of plague developed among the inhabitants of the city.

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The continued presence of small-pox in the near-by states and Alaska has necessitated the continuance of medical inspection of all arrivals at the ports and on the boundary line of British Columbia. The province has been remarkably free from the disease, considering the number of cases there have been in adjacent states.

At the commencement of the quarantine year, the passengers and crew of the ss. *City of Seattle*, to the number of 350, were undergoing detention at the station on account of small-pox discovered on examination of the vessel by Dr. Mackechnie, at Vancouver, on her arrival from Alaska. Five cases in all developed in quarantine, the last case being discharged from the hospital in January. The buildings at the station were rather taxed to accommodate the large number of European passengers on this vessel. There would have been ample room if part of the hospital building could have been used. Had a small cottage been available for the few small-pox patients, the large hospital building might have been used for the accommodation of suspects. Such a cottage hospital has been provided for in this year's estimates. When this is built ample accommodation should be had for all classes of passengers in seasons of ordinary travel. Other buildings and improvements at the station provided for, and which should soon be in course of construction, are : laboratory building, house for assistant medical officer, house for the engineer of the quarantine steamer, and some small buildings for different purposes, and a covered passage way on the wharf leading to the disinfecting building. A second disinfecting chamber is to be constructed, and a new boiler house made. Work in connection with the latter is now being done. An electric light plant—a much-needed improvement—is also to be installed.

The steamer *Earl* received a new boiler during July. The old one gave out entirely, going in such a way that further repairs could not be made, so that the boat was laid up for several months waiting for the new boiler to be built. A large naphtha launch was hired for a boarding boat, although the services of a steamer had to be at times secured. The launch was finally bought, as an agreement had been made that if the government elected to purchase, any money paid as hire should go on the purchase price. The launch was so long in use that it was in great part paid for in this way. It has proved a decided acquisition to the station, and is very convenient and serviceable. The man employed as night watchman is able to run the launch, so that it is not necessary to depend on any of the crew of the *Earl* for the purpose.

An approach was made from the shore to the middle of the large wharf for the purpose more particularly of bracing the wharf, as it sometimes gets hard knocks from the large steamers. Last spring the *Empress of China* crashed into the wharf, doing damage to the extent of \$2,000 ; the repairs were made at the expense of the Canadian Pacific Railway Company. The upper third of the pipe line supplying water for the station was renewed with four-inch cast-iron pipe ; the old pipe had pitted and was leaking badly. The saloon detention building was painted inside and out, and the inside of the hospital building was painted throughout, cracks in the plaster filled, and the walls painted, so that the inside now presents a very satisfactory appearance. More painting is to be done this winter.

Some vessels which arrived during the year require special mention. The British ss. *Caithness*, from Morovan, Japan, was passed at this station on April 17, going to Omoa for coal, and thence to Port Townsend. On arrival at the latter place, the quarantine officer found seven of the crew coming down with small-pox. It was afterwards ascertained that one of the crew had, on leaving Japan, a very mild attack of the disease, so slight, in fact, that no heed was given to it by the man himself, the captain or any one on board. It was from exposure to this case that the cases developed after leaving here. No history of any sickness was given in the captain's sworn declaration made on arrival, and as the crew mustered on deck all appeared in perfect health, and no sign of any recent illness was to be discerned. The man

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who had been sick had recovered, as was afterwards learned from the officer at Port Townsend, without leaving any pit or marks on the body, so that failure to recognize anything wrong when vessel was here will be understood. H. M. S. *Condor*, 106 men, arrived April 28, from Panama, having landed ten cases of yellow fever there a month previously. Another case broke out the day after leaving, but was convalescent in two weeks. The vessel was thoroughly disinfected throughout, and the crew bathed and their effects disinfected, the officers and men expediting the work in every way they were able. She was then given pratique. The Norwegian ss. *Horda*, from San Francisco, was held twenty-four hours for clear diagnosis of a case of fever found on board. This proved to be la grippe. The R. M. S. *Empress of China* arrived here July 3, ten days after being discharged from quarantine at Nagasaki, where she had been held on account of two cases of plague having occurred among her steerage passengers on the way up the China coast. Fortunately, all were well on arrival at this station, but special preparations had been made to receive the vessel in case further sickness had shown itself. The quarantine staff were all given preventive inoculations with the Haffkein prophylactic.

It might be mentioned that the Nippon Yusen Kaisha have doubled their fleet of vessels sailing here. A steamer of this line now arrives every two weeks. The Canadian-Australian line has larger steamers on the run than formerly. Other companies trading to these ports are already building or preparing to build more and larger vessels.

Dr. W. H. K. Anderson was appointed as assistant medical officer and bacteriologist at the William Heal station in December last. His services as assistant at the station have been of great value, and as an expert bacteriologist, services he might at any time be called upon to render would be indispensable, and should plague come to this station, by his work in the laboratory positive diagnosis of the cases could be made. That assurance and the help he has given me in routine work have sensibly relieved the somewhat heavy responsibilities of the work here previously. Charles H. Higgins, who was here temporarily as bacteriologist, was recalled to Montreal in December.

Besides the cases of small-pox from the ss. *City of Seattle*, one of the passengers had to be taken care of in the hospital for a number of weeks, as he had a severe attack of inflammatory rheumatism, and could not be moved. Other cases of sickness were also in hospital from this steamer, but were well enough to leave with the other passengers when the quarantine period expired. No further cases were in the hospital until the middle of October, when two Chinese steerage passengers were removed from the *Empress of Japan* because of the exhibition of high fever on arrival at this station. As the men had just been taken sick, and it was impossible to be positive as to the diagnosis of their ailment, they were held to make certain it was nothing infectious. They both proved to have bad cases of pneumonia, and one of them died on the sixth day.

I have the honour to be, sir,

Your obedient servant,

A. T. WATT, M.D.,

Supt. B. C. Quarantine.

The Honourable

The Minister of Agriculture,
Ottawa.

No. 9.

(W. H. K. ANDERSON, B.A., M.B.)

VICTORIA, B.C., October 31, 1901.

SIR,—I have the honour to submit the following report of the bacteriological laboratory work at William Head for the year ending October 31, 1901.

On your order, I left Ottawa on December 11, 1900, to take up the work of the laboratory at this station in succession to Dr. Chas. Higgins, who had returned to his work at Outremont, Que. I arrived at William Head on December 20, and took charge of the laboratory. I immediately put it into working order, and prepared a supply of media to be ready for any case arriving which might require a bacteriological diagnosis. In the early part of the year no such case presented itself.

To familiarize myself with the appearance and cultural peculiarities of the bacillus *pestis bubonicæ*, I obtained from Hong-Kong two culture tubes inoculated from the bubo of a case of plague. I also investigated a tube culture of the germ left in the laboratory. Both these germs having been found to have lost virulence, either from age or the antagonistic action of pus germs present, I wrote to the Director General of Public Health, and through him received from the Marine Hospital Service, San Francisco, two viable cultures of the plague bacillus. These I have since been investigating by the usual methods—inoculation of guinea pigs, cultures and subcultures in broth and on agar and gelatine.

In the latter part of June I inoculated with Haffkein's Prophylactic all the residents and employees of the station in anticipation of the arrival of the R. M. S. *Empress of China*, which was at that time held in quarantine at Nagasaki on account of plague having been found on board. The day following, I re-inoculated all who had not shown a good reaction to the first injection.

This month I made a bacteriological examination of two cases showing high fever on board the R. M. S. *Empress of Japan*, and confirmed the diagnosis in each case of lobar pneumonia.

Besides the work done with the plague bacillus, on two occasions I have examined specimens obtained from the lepers on Darcy Island, and have with some difficulty demonstrated the presence of the bacillus *lepræ*.

I have been at some difficulty and inconvenience in my work in the present temporary laboratory, but all such objections will be overcome in the new laboratory for which appropriation was made at the last session of parliament.

I have the honour to be, sir,
Your obedient servant,

HAROLD ANDERSON, B.A., M.B.

The Honourable
The Minister of Agriculture,
Ottawa.

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No. 10.

(R. L. FRASER, M.D.)

VICTORIA, B.C., October 31, 1901.

SIR,—I have the honour to submit my report for the year just ended.

My duties consist in inspecting all vessels arriving at this port from Puget Sound or Alaska.

The number of ships examined was 1,161.

No case of contagious or quarantinable disease arrived here during the year.

My inspection has been directed chiefly to preventing the introduction of small-pox, which has been very prevalent in the neighbouring states during the year.

I have the honour to be, sir,

Your obedient servant,

R. L. FRASER, M.D.,

Quarantine Officer.

The Honourable

The Minister of Agriculture.

Ottawa.

No. 11.

(L. N. MACKECHNIE, M.D.)

VANCOUVER, B.C., October 31, 1901.

SIR,—I have the honour to submit the following report, for the quarantine year ending October 31, 1901, of work done at the port of Vancouver.

There have been 471 vessels inspected. One case of measles in a child arrived on the steamer *Mainlander* in August. No other case of infectious or contagious disease has been found on any vessel examined.

Since May 31, from 50 to some 200 tons of Chinese foodstuffs, &c., arriving on each steamer of the Canadian Pacific Railway Company from plague-infected districts has been disinfected by me.

I have the honour to be, sir,

Your obedient servant,

L. N. MACKECHNIE, M.D.,

Quarantine Officer.

To the Honourable

The Minister of Agriculture,

Ottawa.

No. 12.

(A. C. SMITH, M.D.)

TRACADIE, N.B., October 31, 1901.

SIR,—I have the honour to submit my annual report on the Tracadie Lazaretto for the past twelve months.

Registered on the books of the institution to-day are eighteen patients. Of these, fourteen are of French, one of English and three of Icelandic origin. Classifying these patients, we may represent the numbers in the first stage of leprosy to be five ; in the second, twelve ; and in the third, one. Their ages vary from 10 to 62 years.

There were four deaths during the year. Two new cases, aged respectively 10 and 11 years, were admitted from a neighbouring district. As showing the necessity for prompt segregation of leprous persons, I may state that the non-leprous father and mother of these children lived in the same house with a leprous woman for two years. They had a family of several children, two of whom became affected, and were brought to the hospital, where they recently died. At the time of their admission segregation was not attended to as promptly as it is at the present day, and there is no doubt that these two recently-admitted children of the same family had become infected at a very early age through contact with the two who have since died.

Hereditary transmission plays a very unimportant part in the spread of leprosy, except as it may engender a predisposition to it. The disease has so long a period of incubation that persons residing in leprous districts become fearless, and have to be reminded of its danger. I am constantly on the watch for new cases, but have not now as much difficulty as in former years, when the people of leprous districts doggedly refused to assist in the searching out of suspected cases. Segregation is now comparatively easy ; and its good effects in this province are shown in the present decrease, as contrasted with the former increase of the disease.

The prolonged exemption of a community in which the seeds of leprosy have been implanted does not guarantee a permanent immunity from it. In France, leprosy had been practically unknown for a long period. But within recent years it has become so prevalent as to convince the public authorities that urgent measures are imperative to prevent its further spread.

There was not the usual amount of serious intercurrent illness among our patients during the year ; and I have to report that all seem contented and seldom otherwise than cheerful. The general behaviour has been good.

Our lepers are not mentally obtuse ; they evince a keen interest in the passing events of the outer world. Some of them occasionally assist in the work about the grounds. Those in the advanced stages have their sores bandaged daily. All are furnished with comfortable clothing and an abundance of nourishing food.

Some of the patients were induced to make use of chalmogra oil, taken internally in conjunction with creolin, used externally, and in the case of those who persevered in its use, with beneficial results. The general health improved ; ulcers on the limbs healed rapidly ; tubercles disappeared, and swollen faces and hands became reduced to a nearly normal condition. In the case of those who used the remedies

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only intermittingly, but little improvement was noticeable. The results of a more extended use of the drug will appear in my next report.

I have again to report the giving of certificates to several persons falsely reported leprous, thus enabling them to return to employment.

I have the honour to be, sir,
Your obedient servant,

A. C. SMITH, M.D.,

Inspecting Physician and Physician to the Tracadie Lazaretto.

To the Honourable
The Minister of Agriculture,
Ottawa.

No. 13.

REPORT OF THE PUBLIC WORKS HEALTH INSPECTOR.

(CHAS. A. L. FISHER, J.P.)

October 31, 1901.

SIR,—I have the honour to submit herewith my annual report as Public Works Health Inspector to October 31, 1901.

In the Act 62-63 Vic., chap. 30, intituled 'An Act for the preservation of health on Public Works,' clause 1 thereof reads, 'The expression,' 'public work' or 'work' in this Act, means and includes in addition to every public work of Canada, every railway, canal, bridge, telegraph and other work within the legislative authority of the parliament of Canada.

Wishing to have the above clause of the Act more clearly defined in the interest of the public, and for the carrying out of the regulations thereunder, I wrote the Deputy Minister of Justice on March 28, 1901, requesting his written opinion as to the work or works covered by clause 1, of the said Public Works (Health) Act, 1899, and especially regarding its application to railway companies.

On April 3 following, I received his reply, containing the following opinion, and quoting authorities therefor, viz. :—

'All works within the legislative authority of the parliament of Canada are covered by section 1 of the Public Work (Health) Act, 1899.

'What kind of works are within the jurisdiction of parliament may be ascertained by reference to the British North America Act, sections 91 and 92.

'Any works coming within any of the classes of subjects as to which the parliament of Canada has exclusive jurisdiction, under section 91, would be within the section, and also any work belonging to a class which is excepted from the exclusive legislative authority of the provincial legislatures, by paragraph 10 of section 92 of the British North America Act.

'So far as railways are concerned, they do not become subject to the legislative authority of parliament within the meaning of section 1 of the Public Works (Health) Act, merely because they have been subsidized by parliament.

'Whether they are or are not within such legislative authority, depends upon such rules as are applicable to other classes of works.

'In this connection, I may refer you, in addition to the provisions of the British North America Act, above referred to, to the Railway Act, 51 Vic., chap. 29, sections 3 to 7, inclusive, and section 306.

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‘By the latter section, you will observe that the Intercolonial Railway, Grand Trunk Railway, North Shore Railway, Northern Railway, Hamilton and North-Western Railway, Canada Southern Railway, Great Western Railway, Credit Valley Railway, Ontario and Quebec Railway, and the Canadian Pacific Railway, are declared to be works for the general advantage of Canada, as is also each and every branch line of railway connecting with or crossing the said lines of railway or any of them.

‘All these railways, therefore, and their branches and lines connecting with or crossing them, are by virtue of sub-paragraph (c), of paragraph 10, of section 92, of the British North America Act, within the legislative authority of parliament, and are, therefore, subject to the provisions of the Public Works (Health) Act.

‘There are also almost every session of parliament, many railways and other works declared to be for the general advantage of Canada, and these as well as works which come with subparagraphs (a) and (b), of sub-paragraph 10, are within the legislative authority of parliament.’

Finding therefore that the regulations made by Order in Council of January 31, 1900 (under the said Act), for the preservation of health and the mitigation of disease among persons employed in the construction of public works, was somewhat inoperative, they on the 13th day of May, 1901, were by Order in Council, rescinded, and new regulations passed and established in lieu thereof.

As soon thereafter as a sufficient number of the Public Work (Health) Act, 1899, and the regulations thereunder, could be printed, I mailed copies of the same to contractors, managers or others in charge of all public works, railways, mining or other public companies throughout the Dominion, with the following circular letter :—

‘Department of Agriculture,
‘Ottawa,
‘Public Health Office,

‘F. Montizambert, M.D., F.R.C.S.,
‘Director General.

‘Charles L. Fisher,
‘Inspector,
‘Ottawa.

SIR,—By direction of the Honourable the Minister of Agriculture, I inclose you herewith a copy of the Public Works (Health) Act, 1899, also a copy of the regulations under said Act, as passed by the Order in Council of May 13, 1901.

‘I would especially draw your attention to clauses 2 and 3 of said regulations and await your reply thereto, also to such other of the said clauses as may apply to any such work under your charge and request that you see to the carrying out of the same without delay.

‘In fulfilment of my duties under said Act and regulations I will, if thought advisable, visit any such works at an early date, to inspect the same and see if the said regulations are being complied with.

‘I am, sir,
‘Your obedient servant,

‘CHAS. A. L. FISHER,
‘Inspector.’

After receipt of numerous replies to the above letter, I started out on a tour of inspection of the various enterprises coming under the application of the above named Act, of which I had been notified that work was in progress, but in order not to complicate the various works, and to simplify matters for those who may read this report, I will divide the public works coming under the application of the said (Health) Act, into three classes, viz. : 1st, canals, 2nd, railways, 3rd, mines and works of other public companies.

CANALS.

In the various works of the kind being carried on by the Dominion government, I found that the sanitary condition of employees was being fairly well looked after by contractors, or others in charge, but there seemed to have been no regular medical supervision, until after the receipt (by said contractors or others in charge) of the new regulations in force, under the Public Works (Health) Act, 1899.

The works at Farran's Point, under the charge of the Canadian Construction Company as contractors, I found to be well advanced towards completion, and but few men employed, but they were well located, sanitary conditions good, and had hospital accommodation within a reasonable distance.

At the Rapide Plat Canal works, the employees were being well looked after by the contractors, Weddell, McAntiff & Co., and had good hospital accommodation at Morrisburg, close by.

At the Galops Rapids Canal at Iroquois, under contract to Messrs. Larkin & Sangster, I found the work almost completed and few men employed, they being house in the surrounding villages, and having medical men within call at all times, and hospital accommodation within a reasonable distance either east or west of them. The works there have apparently been carried on under strict sanitary conditions, and both the government and contractors may feel proud of the work as constructed.

The works on the same canal at Cardinal, under contract to Messrs. Wm. Davis & Sons, are not in such an advanced state, and a large number of men are employed, many of them being comfortably housed with the surrounding residents, and all having the supervision of the medical men of the village. The permanent hospital used when necessary, is at Prescott, a few miles west, but the contractors have the necessary tents, &c., for use in an emergency. There were a few cases of fever there last spring, and a threatened outbreak was apprehended, but owing to the prompt measures taken, there was no spread of the disease, and it was quickly wiped out.

The upper works on the same canal, about three miles west of Cardinal, under contract to S. E. Cleveland, or Cleveland Brothers, are well advanced, but as there is yet a great deal to be done, a large number of men are employed.

The contractors there have taken every sanitary precaution, and made many improvements in the interest of their employees, seldom carried out to such an extent on public works.

The location of the works being entirely isolated from any town or village, the contractors have secured a considerable extent of land, and built substantial, comfortable and decorative detached houses for each of their married employees, of whom there are quite a number. These houses are each surrounded by flower beds or garden plots, are wired for electric lighting, have water closets and baths, and are supplied with water by pipes, and electricity for lighting, both from works erected specially for that purpose.

The single men are well housed and cared for in two large boarding-houses, erected by the contractors, and granted to suitable parties, who have to board and lodge the men at a stipulated figure per week. The contractors retain the supervision of those houses, and see that the best food is supplied, and the sanitary arrangements are well looked after; they supply water and electric light, but have no interest in the purchase of supplies therefor, or profits therefrom, but guarantee the board of their men, who must settle weekly. Croquet and other lawns have been laid out in the grounds, and provision made for the healthful amusement of the men, their wives and families.

Such care has been taken in a sanitary way, that not even a pailful of stagnant water could be found in the location of the works or surroundings.

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The health of the men and their families is and always has been good, and no threatened outbreak of disease has ever occurred.

No special medical man is employed to superintend the employees of the works, but arrangements have been made so that a telephone call will quickly bring the attendance of a qualified M.D.

If a permanent hospital were found necessary, the one at Prescott, a few miles west, would be used, but the contractors are supplied with tents or other requirements in case of an emergency.

The men employed on these works, with the exception of some old foremen, are all Canadians, the contractors believing that two Canadians are equal to three foreigners such as are generally employed on such works.

The work done on this contract will, I think, compare favourably with anything of its kind, and if I were on the outlook for a sanitarium in which to spend the summer, I doubt if I could select a more healthy or pleasant resort.

At the Trent Canal works, section No. 1, at Peterborough, under contract to Messrs. Covey & Lavierdiere, the work was nearly completed, and few men employed, so that it was not necessary for the contractors to fulfil the requirements of the regulations under the Public Works (Health) Act, 1899.

There had not, during the progress of the work, been any outbreak of disease, and if there had been, good hospital accommodation is provided at Peterborough.

At section No. 2, Balsam Lake division of Trent Canal, and the near-by village of Kirkfield, there was, last spring, a sudden and simultaneous outbreak of small-pox. On receipt of the information by telegram, I immediately visited the village and canal camp, and found that such efficient work had been done by the local health officer, Dr. J. F. Ross, of Kirkfield, in quarantining the canal camp, and the various houses in the village where those attacked were confined, and also the houses they had lately visited, that there was not much likelihood of the disease spreading. On my visit to the canal works camp, I gave a copy of the regulations under the Public Works (Health) Act, 1899, and instructions thereon, to Mr. Sangster, a member of the firm of Larkin & Sangster, the contractors for said section, and who was quarantined in the camp. He was well pleased thereat, and immediately set about to fulfil the requirements of said regulations, and on the recommendation of the said contractors in writing being sent to me, John McKay, M.D., of Woodville, Ont., was appointed medical officer for said section, as provided by the said regulations.

On making inquiry and investigation as to the cause of the simultaneous outbreak of the disease, I found that it was caused by the presence (at a social gathering of twenty-one young people), of a shanty man recently returned from the Sudbury district, and that the only one of the party who did not contract the disease, was one who had lately been vaccinated, and that I consider as a pretty good proof of the efficacy of vaccination.

In a report just received from the Medical Officer, Dr. McKay, he says :—

‘In reference to the sanitary condition of section 2, Balsam Lake, division of Trent Canal, I beg leave to report that it is most satisfactory. There has not been a single case of typhoid fever, diphtheria, scarlet fever or measles on the works from its commencement. In regard to the small-pox, the outbreak was mild and all recovered perfectly. The most rigid precautions were taken by the municipal authorities, and also by the contractors, Messrs. Larkin & Sangster, and the disease was apparently stamped out, as there has not been a case since last May. There has not been a death among the workmen so far, and nothing more serious than ordinary bronchitis has so far prevailed. About a third of the men employed are Italians, none of them had small-pox, and they have all been very healthy, with the exception of cases of indigestion, no doubt due to improper diet. Those Italians are fairly clean in their habits, bathing once a week, as a rule, and drinking nothing stronger than lager beer. They are industrious and frugal, and all appear to be very anxious to learn English.’

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At No. 3 section of the Balsam Lake division of the Trent Canal works, near Gamebridge, Ont., under contract to Messrs. Brown & Aylmer, the regulations under the Public Works (Health) Act, 1899, are being carried out as far as found necessary, and thereunder, on the recommendation of the contractors in writing, A. Grant, M.D., of Beaverton, Ont., has been appointed medical officer.

In a late report to me he says : 'In regard to No. 3, Trent Canal, I may say that the boarding houses in connection with the works, are in a fairly sanitary condition, and that there has been no infectious diseases. Some of the men in July went home with symptoms of typhoid, but they boarded in farm houses.'

RAILWAYS.

In regard to public works of this class, I have to say that my circular letter sent out with copies of the Health Act, and regulations thereunder, has been fairly well replied to, and that I have been notified of various new works in progress or in contemplation, but some of these are not of sufficient magnitude to come under the application of the regulations provided by the Public Works (Health) Act, 1899.

QUEBEC AND LAKE ST. JOHN RAILWAY.

This company were constructing at St. Gabriel, seventeen miles from Quebec, a deviation of the main line, necessitating the building of about four miles of new road, including a bridge over the Jacques Cartier river. The force of men employed, was about 175, principally residents in the vicinity, and the number of men camped at the works, did not exceed forty. Sanitary regulations were well looked after, and every necessary hospital accommodation was well provided at Quebec. With the exception of the bridge, the work is now likely completed.

CHATEAUGUAY AND NORTHERN RAILWAY.

I was notified in June last that the above company intended to construct the present year, a line of railway between Montreal and Joliette, a distance of thirty-seven miles, but on inspection lately, I found that the work had not yet been commenced.

THE ALGOMA CENTRAL AND HUDSON BAY RAILWAY COMPANY.

The main line of this railway is completed to the Gonlais river, a distance of thirty miles from Sault Ste. Marie.

From the Gonlais river for seventy miles, Farquier Bros. have the contract, and had about 1,000 men employed.

Between Farquier Bros. contract and the Michipicoten division, Messrs. Comnece & Bowman have the contract, and had about 700 men employed.

MICHIPICOTEN DIVISION.

This branch, extending from Michipicoten to Helen Mine, twelve miles, has been completed.

JOSEPHINE BRANCH.

From Josephine Junction, on the Michipicotin branch, nine and a half miles has been completed.

MANITOULIN AND NORTH SHORE RAILWAY.

Between Sudbury and the Gertrude Nickel Mine, a distance of thirteen and a half miles has been completed.

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Between the Gertrude Nickel Mine and Vermillion river, five miles, about 300 men were employed.

From a point on the Canadian Pacific Railway, near Stanley station, southerly to the Whitefish river, on Lake Huron, sixteen and one-half miles, the contract was about to be let, when some 1,200 extra men would be employed.

The last two named railways, are being constructed by the Clergue Syndicate, with headquarters at Sault Ste. Marie, Ontario, and the regulations under the Public Works (Health) Act, 1899, are being fully carried out, but as I give a more detailed report upon that subject, *re* said syndicate, under the class 'Mines and other Public Works,' I beg to refer you thereto.

CANADIAN NORTHERN RAILWAY.

This company is comprised of the Winnipeg Great Northern, Manitoba South-Eastern, and Ontario and Rainy River Railways. Then, there is the Port Arthur, Duluth and Western Railway, from Port Arthur to Gunflint Lake on Minnesota

boundary, about eighty-five miles. A very large body of men have been employed on construction work on the above lines, which are now controlled and operated by Messrs. Mackenzie & Mann.

The regulations under the Public Works (Health) Act, 1899, have been well carried out thereon, a number of copies thereof having been supplied at the request of the secretary of the Canadian Northern Company for distribution to the various contractors. Tents and other necessities were provided, and permanent hospital accommodation at hand at several near points.

There were a few cases of small-pox last spring at Beaver Mills, a station on one of the above lines, and where an international bridge is being built under contract to Messrs. Mackenzie & Mann, but the disease did not obtain much headway, and was soon stamped out.

CANADIAN PACIFIC RAILWAY.

This company are constructing, under a charter to the Kootenay and Arrowhead Railway Company, a line from Lardo, at the head of Kootenay Lake, to Selkirk, at the foot of Trout Lake, British Columbia, a distance of thirty-five miles, exclusive of sidings, ways, spurs, &c.

Owing to a strike among various employees in British Columbia, progress has been slow, and the line has not been completed, but when that has been accomplished, it will give necessary access to what promises to be one of the richest mining districts of the country.

Several hundred men were employed on the above work, and health regulations were being well attended to, and there had been no disease among the employees. Temporary hospital accommodation was provided in case of an emergency, and a good, permanent one could be easily reached within a reasonable distance.

I understand the above company, in any further works requiring it, will be pleased to carry out very thoroughly the requirements of the regulations under the Public Works (Health) Act, 1899.

MINES AND WORKS OF OTHER PUBLIC COMPANIES.

Consolidated Lake Superior Company.

This company is, perhaps, better known as 'The Clergue Syndicate,' with headquarters at Sault Ste. Marie, Ont.

I have previously referred to some of the ventures of this syndicate, under the class 'Railways,' but owing to the very large number of men they now employ, and

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which they are likely to soon greatly increase, the magnitude of their undertakings and the great advantages the Dominion of Canada is likely to receive therefrom, I think it advisable to mention the various enterprises and public works they own or control, are now operating or constructing, and are putting in operation, at an outlay of millions of dollars, and as fast as the necessary men therefor can be secured, viz. :

The Algoma Central Railway and Steamship Company.

The Manitoulin and North Shore Railway Company.

The Algoma Commercial Company.

The British American Express Company.

The Algoma Central Telegraph Lines.

The Lake Superior Power Company.

The Tagona Water and Light Company.

The Michigan Lake Superior Power Company.

The Algoma Steel Company.

The Sault Ste. Marie Pulp and Paper Company.

The Algoma Iron Works Company.

Chemical Works.

Large lumber camps, and nickel, copper and iron mines.

The Helen iron mine, owned by the above syndicate, is situated at Michipicoten, and is among the leading iron mines of the world, owing to the enormous mountain of ore, and its richness of quality. Foley Bros., four Canadians, have the contract for taking out the ore, and employ about 400 men.

A few miles to the north is the Josephine iron mine of this company, to which a branch line of railway has just been constructed.

To show how thoroughly the regulations under the Public Works (Health) Act, 1899, are carried out by the above-named syndicate, I beg to say that the following fundamental rules are the basis on which the sanitary conditions of all their camps are regulated, and so heartily, as a general rule, do the employees of the various companies seem to assist in the carrying of them out, that I am pleased to be able to say that their camps compare most favourably with any in the land.

The site of all camps is selected with the object of convenience, but also in regard to the watershed of the section, so that the water supply of the camp may come from above any possible contamination from the drainage from the camp or elsewhere. All kitchen refuse and waste must be regularly burnt, and thus destroyed. Closets and washrooms are placed in convenient places, and strict regulations govern their use, no nuisances being tolerated. Cleanliness is encouraged in every way. Sleeping camps are thoroughly aired and flushed out each day. Spitting on the floors of camps is strictly prohibited, receptacles for same being placed in convenient places and regularly cleaned.

All camps are open to inspection by the company's surgeon, and the sanitary conditions are subject to the order of the allied companies' board of health, consisting of the following officers :—

Mr. C. R. Loring, Superintending Sault Ste. Marie Pulp and Paper Company.

Mr. H. Durer, Master Mechanic, Algoma Iron Works Company.

Mr. T. J. Kennedy, General Superintendent, Algoma Central and Hudson's Bay Railway Company.

With the company's surgeon, Dr. J. R. McLean, as health officer and sanitary inspector.

The medical conveniences for the employees of the companies, consist in a staff of eight physicians.

The employees proper of the railway company, numbering about five hundred men, are under the care of the companies' surgeon at Sault Ste. Marie and Michipicoten Harbour.

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The General Hospital at Saut Ste. Marie, Ontario, gives them the facility of as good nursing and hospital attendance as can be secured anywhere, and has in the past, done most valuable work in this respect.

The contractors along the line of construction, have in all, some two thousand men, with a staff of five physicians located along the line of work, who cover the ground daily, weather permitting.

Any case of severe injury or illness that can safely be moved, is brought at once to the hospital at Sault Ste. Marie, where arrangements are made for their care.

There is also situated at the Helen Mine, a most complete hospital, where patients from the upper end of the construction line are attended.

Midway between, at Agawa, the company have another good sized hospital in charge of a physician.

All along the line, there are tents, &c., for any emergency case of an infectious nature, and all due care and precaution is taken to avoid any serious outbreak of any such disease.

ALBERTA RAILWAY AND COAL COMPANY.

The coal mines of this company are situated at Lethbridge, N.W.T., and are under the management of Mr. P. L. Naismith.

A large number of miners are employed, and health regulations are strictly enforced, the miners willingly complying with the demands of the company in that respect, and no serious disease has occurred among them.

One of the best equipped hospitals to be found anywhere, is maintained by the company, and is situated within fifteen minutes walk of the mines.

HALL MINES AND SMELTER.

These are situated at Nelson, British Columbia, and employ a large number of men.

Health regulations are fairly well carried out, medical supervision is provided, and good hospital accommodation is obtained in the town.

PAYNE MINING COMPANY.

The mines of this company are situated in the Slocan district, near Sandon, B.C. A considerable number of miners are employed, who are well paid, well housed, and well fed; the health regulations are excellent, and a miners' hospital is maintained in the town of Sandon.

THE SLOCAN STAR MINES.

These mines are also near Sandon, B.C., and when in full operation, employ several hundred miners.

The sanitary regulations fulfil requirements, and the miners' hospital at Sandon is at their service.

NEW VANCOUVER COAL MINING AND LAND COMPANY, LIMITED.

The coal mines of this company are situated at Nanaimo, B.C. About 1,200 men are employed, the company having the largest pay-roll on the Pacific coast.

Health regulations under Dominion Act, 1899, are well carried out, the employees paying \$1 per month for medical supervision, and attendance on themselves and families.

Splendid hospital accommodation is provided in the town, and only a short distance from the mines.

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WELLINGTON COLLIERY COMPANY, LIMITED.

The coal mines of this company are situated at Extension, B.C., about eight miles from Nanaimo. About 1,000 men are employed, who are assessed for medical supervision and attendance, and health regulations are enforced. The hospital at Nanaimo is used when necessary.

I have much pleasure in calling your attention to the excellent health and condition of all classes of employees on public works coming under the application of the Public Works (Health) Act, 1899, and to say that from conversation with many of them, they are well pleased at the passing of the said Health Act, and the enforcing of the regulations thereunder, also that contractors, railway managers, and those in charge of other public works, are taking an interest in the carrying out of said regulations, seeing the advantages gained therefrom, and as an instance thereof, I quote below a clause of a letter addressed to me in my official capacity, from one of the largest employers of labour in the Dominion, George B. Reeve, Esq., second Vice-President and General Manager of the Grand Trunk Railway Company of Canada, viz. :—

‘ You will find that we are willing to give every facility for the examination of our works, as we are fully imbued with the importance of perfect health, not only with reference to the public generally, but also in connection with all departments of our railway. It is the healthiest men that do the best work.’

I have the honour to be, sir,
Your obedient servant,

CHAS. A. L. FISHER,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

CATTLE QUARANTINE.

No. 14.

REPORT OF THE CATTLE QUARANTINES IN CANADA

From November 1, 1900, to October 31, 1901.

(BY PROFESSOR DUNCAN McEACHRAN, F.R.C.V.S., V.S. Edin., D.V.S. McGill,
Chief Inspector of Live Stock for Canada.)

OFFICE OF THE CHIEF INSPECTOR OF STOCK,
MONTREAL, October 31, 1901.

SIR,—I beg herewith to transmit my twenty-fifth annual report of the Dominion Cattle Quarantines and to append hereto the reports of the Pathologist and Assistant Pathologist.

It is my pleasant duty to again call your attention to the general healthfulness of all classes of live stock throughout the Dominion. Hog cholera reappeared in a few of the old centres, but was effectively and immediately dealt with by your inspectors, and is at present not known to exist in the Dominion. Sheep-scab also reappeared in the counties of Peel, Victoria and Ontario, but was at once eradicated. Actinomycosis has greatly decreased. Pictou Cattle Disease still continues to lurk in old centres, but it also is decreasing. Tuberculosis is still decreasing, notwithstanding the determined opposition which certain importers raised to the only reliable diagnostic agent known, tuberculin. The decrease in the number of animals tested is due to testing having been stopped during spring and summer months as explained at page 82, of this report.

I beg specially to call your attention to my report of 'The British Congress on Tuberculosis for the prevention of Consumption,' which I attended as one of your representatives.

Outbreaks of glanders, especially in Manitoba and the Territories, owing to the importation of cheap horses from the south, still continue. With a view to furnishing information as to its nature and symptoms, a bulletin has been prepared which will be freely distributed among horse breeders throughout the country. Anthrax and symptomatic anthrax seem to be becoming more frequent in occurrence; a bulletin dealing with these diseases has also been prepared for distribution among all classes of the agricultural population. These diseases have been successfully arrested by the use of Pasteur's vaccines. Malarial fever in horses has caused considerable mortality among horses in the district of Northern Alberta, and a peculiar outbreak of abscess on the poll and withers has been reported from the Cariboo district. Both require investigation to elucidate the true nature and cause.

I have the honour to be, sir,
Your obedient servant,

DUNCAN McEACHRAN.

Chief Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

EXPORTATION OF LIVE STOCK FROM MARITIME PORTS.

TABLE showing numbers shipped during five years as reported by veterinary inspectors.

The numbers here given are not intended for statistical purposes, being merely records of inspections, see minister's own report for correct numbers as furnished by the Customs Department.

	Cattle.	Sheep.	Horses.	Swine.
1897	117,428	62,406	10,651	. . . . .
1898	111,948	47,050	7,057	. . . . .
1899	97,014	62,308	4,980	174
1900	103,511	7,734	3,597	63
1901	94,385	1,583	63,843	70

TABLE showing number shipped from each port.

	Cattle.	Horses.	Sheep.	Swine.
Montreal to Great Britain	80,533	1,160	46,575	. . . . .
Quebec to Great Britain	817	. . . . .	. . . . .	. . . . .
St. John, N.B., to Great Britain	11,835	227	13,619	. . . . .
" to Newfoundland	626	52	2,045	25
Charlottetown to { Great Britain . . . . .	. . . . .	. . . . .	290	. . . . .
{ Bermuda and West Indies	9	49	30	27
{ United States . . . . .	. . . . .	1	. . . . .	. . . . .
Halifax to { Great Britain	259	. . . . .	. . . . .	. . . . .
{ Newfoundland	18	3	. . . . .	. . . . .
{ United States	1	1	. . . . .	. . . . .
{ Bermuda and West Indies	23	79	1,098	9
Summerside to Newfoundland	264	4	180	. . . . .
" to United States . . . . .	. . . . .	7	6	7
Georgetown, P.E.I., to United States . . . . .	. . . . .	. . . . .	. . . . .	2
Total	94,385	1,583	63,843	70

Of these there were 11,718 cattle and 23,702 sheep from the United States.

HORSES shipped by Col. Dent to South Africa as Army Remounts.

(Table kindly furnished by him.)

	Horses.
From the provinces of Ontario and Quebec	5,147
" " New Brunswick and Nova Scotia	115
" " North-west Territories	786
Total	6,048

The army horses were not subjected to inspection by your inspectors as were commercial shipments.

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The above tables refer only to animals inspected by veterinary inspectors under quarantine regulations. Several thousands of Canadian cattle were shipped via the United States ports of Portland and Boston.

As will be seen by inspectors' reports, the health of all classes of stock continues exceptionally good, only 79 cattle, 72 sheep and 45 horses were detained at the shipping ports, most of which were subsequently sent forward.

ANIMALS rejected during the year at the port of Montreal.

	Cattle.	Sheep.	Horses.
For actinomycosis	2	.....	.....
" injuries	74	49	.....
" strangles .....	.....	.....	21
" influenza .....	.....	.....	23
" mange.....	1	.....	.....
Total.....	77	49	44

ANIMALS rejected at port of St. John, N.B.

	Cattle.	Sheep.	Horses.
For pneumonia .....	.....	.....	1
" foul in foot.....	1	1	.....
" acute bronchitis.....	1	.....	.....
" injuries.....	.....	22	.....
Total.....	2	23	1

It is pleasing to note that breeders in all parts of the Dominion are improving their herds by using pure bred bulls the effect of which especially in the Territories and Manitoba is very marked in the quality of the herds. Large numbers of pedigreed bulls have been placed on the ranges, and the old scrub range bull has almost entirely disappeared. The bulls most in demand are Shorthorns and Galloways; the latter have proved highly satisfactory, being found prolific and hardy.

I have much pleasure in reporting that the duties of inspection were satisfactorily performed at the shipping ports by M. C. Baker, D.V.S., C. McEachran, D.V.S., and B. A. Sugden, D.V.S., at Montreal ; by J. A. Couture, D.V.S., at Quebec ; by William Jakeman, D.V.S., at Halifax, N.S. ; by J. H. Frink, V.S., at St. John, N.B. ; at Charlottetown, P.E.I., by A. E. Leckie, M.R.C.V.S., and at Summerside, P.E.I., by W. H. Pethick. V.S.

EXPORTATION FROM MANITOBA AND THE NORTH-WEST TERRITORIES.

In compliance with a request, I have been furnished by the general freight traffic manager of the Canadian Pacific Railway with the following statement of cattle, sheep, horses and swine carried by them from Manitoba and the Territories to Montreal for shipment, for twelve months, ending October 31, 1901 :—

Cattle, 31,456 ; Horses, 1,057.

It will be observed that this is a marked decrease in the number of cattle exported from the west. This is attributed by some to the wet late summer, followed by a very bad fly-season, which kept the cattle from fattening. Notwithstanding this the heaviest cattle yet shipped from Alberta were sent to the Klondike among the first shipments this summer. One steer is reported to have been shipped recently which weighed over a ton.

STOCKERS.

A large number of yearling stockers were put on the Alberta grazing ranges during the past summer, nearly 20,000 head—bought mostly in Manitoba and Ontario—and the prospects are that this branch of ranching will increase. Ranchmen should consider well before expending their capital in stockers, especially the essential points, 1st, the provision for winter feeding—unless they have large fenced fields, roomy yards and comfortable sheds or close brush, with at least a ton of hay per head for yearlings, they should not buy this class of stock. 2nd. of equal importance is it to see that they are well-bred and of beef strains, Shorthorn, Hereford, Polled Angus or Galloway crosses by preference. Dairy strains no matter how cheap they appear to be bought will be a disappointment and their presence in a herd depreciates the whole lot. Ranchmen should not receive stockers too early in the season. The farmer and the middleman will want to get them off their hands as soon as the snow disappears, and too often these domestic yearlings, having been warmly housed and indifferently fed, are shipped to the ranches and turned loose, before the grass has started, to perish in large numbers in the early spring snowstorms, or from eating larkspur or other poisonous plants which come up before the grasses.

The first of June is early enough to have them arrive. They should be in good healthy and strong condition before being put on cars to enable them to stand the fatigue of a long journey. They should be frequently fed en route ; we have known of heavy losses owing to too long fasts. They will winter better and pay in the end better if they are at least twelve months old before being sent to the ranges. It is every one's duty to do his best to keep up the reputation of Canadian steers which hitherto has been high ; to do this we must have them well bred. It is seldom a well bred steer is cut back at shipping time.

IMPORTATIONS—MARITIME CATTLE QUARANTINES.

	Cattle.	Horses.	Sheep.	Swine.
Lévis Quarantine, Quebec.....	390	.....	1,108	63
St. John, N.B., from Great Britain.....	13	6	.....	.....
" " United States	1	.....	.....	11
Halifax, N.S.....	1	8
" from South Africa.....	3
Charlottetown, P.E.I.....	1
Total.	405	17	1,109	74

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Of these 141 cattle, 727 sheep and 5 swine were for the United States.

Seven calves were born in quarantine, two of which died. Twelve cattle were tested with tuberculin, without reaction.

It is satisfactory to note that no disease of a contagious nature was found to exist among any of the imported stock. I have pleasure in reporting that the duties of inspection at the quarantines were satisfactorily performed by J. A. Couture, D.V.S., Point Lévis; William Jakeman, D.V.S., Halifax, N.S.; J. H. Frink, V.S., St. John, N.B.; and by A. A. Leckie, M.R.C.V.S., Charlottetown, P.E.I.

IMPORTATION FROM THE UNITED STATES AT FOLLOWING PORTS.

	Horses.	Cattle.	Sheep.	Swine.	Mules.
St. John, N.B.		1	.....	11	.....
Niagara, Ontario.....		4	3	13	.....
*Point Edward, Ontario.....		18	.....	7	.....
Windsor, Ontario.....		10	1	1	.....
Emerson, Manitoba.....	704	900	114	89	4
Gretna, Manitoba.....	246	169	103	39	2
North Portal, Assiniboia.....	2,984	2,942	57	391	101
Maple Creek, Assiniboia.....	555	103	8,560	.....	.....
Coutts, Alta.....	1,492	3,993	11,486	9	12
Cardston, Alta.....			41,565	.....	.....
Nelson, B.C.....	271	95	7,614	.....	4
Grand Forks, B.C.....	193	45	487	43	1
Victoria, B.C.....	212	37	319	1	4

* There also passed through this port 18 head of cattle and 255 sheep, returning from Fat Stock Exhibition at Chicago.

HORSE RAISING IN CANADA.

The introduction of electric and other motors some years ago led to the idea being widely entertained that we had entered on a 'horseless age,' and that henceforth horse-breeding would become a thing of the past—and to a certain extent the bicycle craze, the motor carriage, but more especially the application of electricity to motor power, in some measure justified this scare, for such it proved to be.

During the past five years horse-breeding as a special effort has been almost entirely given up—not only on the farms of the older settled districts of Canada, but on the stock ranges of the western prairies. Already as a result of this, and owing to the exportation of a few thousands annually, there is a dearth of good horses, which are largely in demand, and readily bring good prices when found. I am safe in saying that good horses will bring to-day double what they would have been sold for three or four years ago, and in many instances a much greater increase in value has been experienced. It is encouraging to observe that many of our most energetic, far-seeing agriculturists are turning their attention to horse-breeding, both in the east and in the west, and such experienced business men know what they are about, and will follow the proper lines in what they do. There are many who breed horses in Canada to whom a few practical suggestions may prove useful, and to them the following hints are addressed.

When you breed, breed to suit your market, and breed what will command the highest price in that market.

Buyers will search for what will fill their orders, whether it be a race horse, a trotter, a park hack, a lady's horse, a hunter, a roadster, a carriage or harness horse of

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any description, including draught horses, light or heavy, and will pay the highest price for the best horse. Aside from the cost of the mare and service of the stallion, the expenses incurred in raising a horse to five years old is the same whether he is a good one or a bad one, a high-priced one, or a dear-at-any-price one ; therefore, when you breed, breed the best.

BREEDING STOCK.

No one disputes the advantages of pure-blood ; 'blood will tell' is a truism well understood by horse men. In using a sire, whatever breed you decide on, see to it that there is no flaw in his pedigree. 'The sire is half the herd,' is another saying of great practical meaning, well understood among breeders. Where expedient, the mare should be, if not pure bred, at least a cross of the same breed as the stallion, violent crossing—such as a thoroughbred mare being served by a Clyde stallion—should on no consideration be practised. Let the farmer mate his mare with a stallion most likely to produce a saleable type, if circumstances necessitate crossing.

POINTS COMMON TO ALL GOOD HORSES.

The following points in conformation should be found in stallions and brood mares : They should be vigorous, active specimens of their breed, of full size (under-sized animals should not be selected for breeding, the tendency is to become smaller) ; therefore, select full-sized breeding stock, but avoid overgrown ones. The colour should be dark. Light, faded colours indicate weakness of constitution, and are undesirable to breed from.

CONFORMATION.

The head should be of medium size of the breed ; it should be pleasing to the eye, the forehead wide, the eyes large and prominent ; it should be well set on to the neck, with a clean-cut out throat. The neck long and the crest full rather than the reverse ('Ewe neck'), the withers high, the back short, the quarters wide, with well-muscled hips and thighs, tail straight and well set on, orifices small and firm, the ribs rounded and deep, the chest deep, the girth large, the muscles of the chest and shoulder well developed. The width of the chest should vary with the breed, but it should not be narrow in any breed. The legs should be symmetrical ; crooked hocks, bent knees, light bone, small or contracted feet, should be avoided. The feet vary with the breed, but in every breed they should be proportionate to the size of the animal, should neither be too wide nor too narrow ; the horn should be of good texture and capable of resisting friction when barefooted, and of securely retaining a shoe when shod. Action is all important and counts a good deal in the value of any kind of horse ; in front it should be bold and free, with prompt lifting of the foot from the ground ; flexing the knee freely (knee action) and putting the foot down fearlessly. Behind, the prompt free lift of the foot, the free flexion of the hock (hock action) and the fearless swing of the foot and limb forward should be looked for in the sire and dam.

SIRES AND DAMS WHICH SHOULD NOT BE BRED FROM.

Blind stallions or mares, subjects of what is known as Specific Ophthalmia, a disease notoriously hereditary ; subjects of navicular disease, ringbone, spavin or broken wind ; having small 'crow eyes,' narrow foreheads, short necks, long backs,

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narrow hips or chests, long legs, light bone, bad tempers. Mares which are poor milkers will not pay to breed from, as the foal is usually stunted from want of milk.

The observance of these few hints in selecting sire and dam may prevent much vexatious disappointment in the result of breeding horses.

The future market of Canadian horses is now assured ; let us breed the best only, and obtain the highest market price and a ready sale for our stock because of its superior quality.

GLANDERS.

It is gratifying to be able to report that glanders may be said not to exist at the present time so far as is known to the department in any of the older provinces ; during the past year only two cases were reported in Ontario—none in Quebec or the maritime provinces. It is occasionally seen in British Columbia, 3 horses having been shot on this account at Nelson. It continues to prevail to some extent in the North-west Territories and in Manitoba, thus :—

SHOT FOR GLANDERS.

	Manitoba.	North-west Territories.
1897-98..	97	96
1898-99.. . . . .	..	118
1899-1900..	80	91
1900-1901..	75	90

There is no doubt that this is a very serious matter, and constitutes a serious menace to the horse breeding industry in the west. For several years in my annual report I have pointed out that the source of infection was the States to the south of the Territories—whence cheap ponies were frequently imported and sold to settlers and ranchmen. The most careful inspector may fail to discover the disease in its early stages. I beg to call your attention to what Commissioner Perry says in his report on this subject : ‘There is one subject that demands attention and that is the ‘importation of a worthless class of horses by half-breeds and Indians. They go ‘south of the line and acquire a certain number of ponies which they smuggle into ‘the Territories. Apart from these being an undesirable class of animal, they are not ‘inspected by any veterinary surgeon and as a consequence glanders or other infectious or contagious diseases can be introduced.’

During the Klondike boom large numbers of such worthless ponies were brought into the Territories, and much disease was thus spread among range horses ; large numbers also found their way into Manitoba, and still continue to be imported there, —hence the prevalence of glanders in that province, notwithstanding the active efforts of the provincial government to stamp it out. During the past summer, this subject has received special attention at the hands of the Mounted Police and the officers of your department but the inspection of semi-wild ponies in bands on the open prairie is surrounded by so many difficulties that inspection cannot be relied upon except when the animals show clinical symptoms. Corrals have been ordered to be built at North Portal and arrangements are required to be made at other points to provide conveniences for thorough inspection and mallein testing when necessary.

I would also suggest that the importation of cheap and dangerous horses be discouraged by imposing a minimum valuation for customs duty of \$50 per head and the prohibiting the entry of the entire band in which glanders is found to exist, all found diseased to be killed without compensation.

The great increase in numbers and values of horses in the west in the near future, requires that some such measure be adopted for the prevention of this plague.

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If horse-breeding is to get the encouragement to which it is entitled, and if we would develop and retain our export markets we must extirpate this disease, and prevent it from being brought into the country.

The following bulletin on glanders will be distributed freely throughout the country for the purpose of informing breeders of its nature, symptoms and means of diagnosis. We hope it will be carefully read and its suggestions acted upon.

GLANDERS IN HORSES.

Now that the suitability of Canada for horse-raising has been demonstrated, and the excellence of Canadian horses has been proved by the severest tests, this country henceforth will be looked to as a field for purchasing of horses by all the European countries, both for civil and military purposes.

The enormous advances in values within the past three years, owing to increased demand and scarcity of good horses elsewhere, should induce our farmers and ranchmen to recommence horse breeding without loss of time so that we may retain the demand for our produce and increase our output.

Unfortunately in a few instances horses purchased by Imperial officers for remounts were found to be affected by glanders, a contagious disease which is known to exist to a limited extent especially in the western portion of the Dominion, Manitoba and the Territories, due very largely to the importation from the south of cheap ponies which are constantly being brought into the country and sold to farmers throughout the west.

This bulletin has been written with the object of informing those interested of the nature of the disease, means of recognizing it and what each should do to prevent its introduction and arrest its extension; and the Minister of Agriculture hopes that the efforts being made by the official veterinarians and mounted police officers will be seconded by every horse breeder and agriculturist in Canada, as it requires the combined efforts of all concerned to accomplish the desired end.

GLANDERS AND FARCY.

Glanders and farcy are one and the same disease, both are due to a specific virus. They may occur independently or may co-exist, and may be acute or chronic.

The horse, ass and mule are most susceptible. It has also been produced in the dog, lion, goat, sheep, pig, cat, guinea pig and pigeon by inoculation. It is readily communicated to man by inoculation; and grooms with sores on their hands frequently contract the disease from horses which they may be attending. It is due to a rod-shaped straight or slightly curved bacillus with round ends, called the *bacillus mallei*, which is ærobic, that is, requires oxygen of the air to live and thrive. It is found in the discharges from the nose, in pus of ulcers, in farcy buds, in tubercles when found in the lungs, in diseased glands, and less frequently in the blood when the disease assumes the acute form.

SYMPTOMS AND DIAGNOSIS.

Occasionally the symptoms in chronic cases are obscure. In acute cases they are pronounced, consisting of rigors, fever, swelling of the glands in the submaxillary region, often farcy buds along the course of the lymphatics of the hind legs or shoulders; a leaden colour of the mucous membrane of the nostrils, and in later stages, patches of congestion, erosions and ulcers which have depressed mouse-eaten-like centres, raised edges surrounded by a red areola and discharging a sanious pus. The localization of the lesions (chancres and tubercles) occur in the membrane lining the nostrils and

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upper air passages, in the larynx and lungs. In true glanders, the submaxillary glands are enlarged, hard and attached to the sides of the jaw. The lesions are frequently confined to one nostril—the discharge from which is constant, though seldom excessive, but always adhesive, often of heavy specific gravity sinking in water, and in advanced stages it is offensive and mixed with blood indicating the exposure of blood vessels by the ulceration and the implication of the cartilage or bones.

In the lungs numerous small tubercle-like nodules are found resembling milliary tubercles of tuberculosis, which when present produce quickened breathing and cough. In the superficial form usually called farcy, the localization is confined to the chains of lymphatic glands in the groin and shoulder which swell, suppurate, and form open ulcers which discharge a similarly adhesive pus.

It may commence as glanders, farcy setting in subsequently or vice versa. The former is incurable, although some authorities claim to have witnessed recoveries. Farcy is supposed to be curable by some, but the one so often runs into the other, and the risks of error so great that we prefer to deal with both forms as incurable.

In a country of such vast extent and variety of climate as Canada, we find corresponding variations in most diseases of animals, and in glanders particularly is this the case. It is a disease especially of the cheap horse, thus in the crowded cities there are many poor men who work cheap horses and stable them in buildings unfit for animal habitation. These are the horses which becoming infected spread and perpetuate this disease by infecting buildings, drinking troughs, &c. In them, too, we meet with it in its most virulent and acute forms.

On the farms, too, infection is spread by the congregation of horses in crowded stables on market days and during church service. In farm horses which are a great deal in open air and sunshine it usually assumes a somewhat chronic form; acute cases being less frequently seen than in cities.

As seen in the prairie country and Rocky Mountain regions it is not nearly so pronounced in its manifestations, is seldom acute and often very deceptive and difficult to diagnose clinically; hence the greatest care should be exercised by those who bring horses into Manitoba and the Territories to take every precaution against its introduction. It is to be feared that during the past four years this disease has been repeatedly imported from the south by cheap ponies brought in to sell to mining outfits; true, careful inspection is ordered and carried out by the veterinarians of the mounted police, and they do the best they can under the circumstances, yet we know that inspection of large numbers of semi-wild horses on the prairie cannot be other than unsatisfactory, as glanders in a latent form can only be detected by close examination or the mallein test, which is usually impractical, for want of necessary facilities and difficulty in handling them. Unfortunately also many of those who purchase cheap horses for riding and packing purposes have little knowledge of horse flesh and are ignorant of the indications of disease, or the danger to which even one diseased horse may expose those men and horses with which it comes in contact. This ignorance tends to spread this insidious malady.

Fortunate indeed is the fact that the bacillus of this disease readily dies if exposed to sunlight. The bright scorching sun of our territorial regions and the strong winds so often prevailing there, are our surest safeguards against it, as is also the usual practice followed by travellers of turning horses loose on the prairie or on a picket line instead of into a stable or shed, thus preventing to a large extent both direct and stable infection.

MALLEIN AS A TEST.

Mallein, which is a sterilized glycerine extract from cultures of the *bacillus mallei*, the pathogenic bacilli of glanders, is the analogue of tuberculin, and is believed by those who have had most experience of its use as a diagnostic agent to be as reliable in dis-

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covering occult cases of glanders when not discernible by symptoms, as is tuberculin in tuberculosis.

Its Injection and Results.—It is injected subcutaneously in the same manner as tuberculin—the normal temperatures being taken during the previous day. If glanders exists, within from six to eight hours there will be a hot painful swelling at the point of injection, and a rise in temperature of two degrees to five degrees or more, and occasionally a rapid development of the general clinical symptoms may follow. In all instances where practicable the test should be applied to every doubtful animal, and to all which have been exposed to infection direct or mediatory.

We recommend every reader of this bulletin to consider well the following:—

FACTS WHICH HORSE OWNERS OUGHT TO KNOW ABOUT GLANDERS.

It is contagious and communicable by direct contact and mediatory agents, such as feed boxes, drinking troughs or pails.

It is communicable to man, when the virus comes in contact with a sore, or into the mucous membrane of the eyes, nose or mouth.

It is incurable in both animals and man.

In man it is a most painful and loathsome disease, with offensive discharges from the throat and nostrils, and unhealthy boils and blebs all over the body.

In buying horses, nasal discharges should always be viewed with suspicion, and horses with such should be refused unless on expert advice.

WHAT EVERY HORSE OWNER OUGHT TO DO.

Immediately on discovering symptoms indicatory or suspicious of glanders, isolate the animal completely, and report his suspicion to the Minister of Agriculture.

On no consideration should a horse owner try to hide such a suspicious animal, he endangers his other horses, the lives of men working with or about the horse, or of members of his family, or it may be his own life.

In the Territories, report to the Commissioner of the North-west Mounted Police, who will order necessary action on behalf of the Minister of Agriculture.

The owner should carry out to the letter all preventive measures suggested by the veterinarian, even at a good deal of trouble and expense. In dealing with infected stables, nothing short of removal and burning of all woodwork, feed boxes, hay boxes or racks, will be effective, the floors and stall divisions may be planed and limewashed, or scrubbed with some disinfectant solution.

The following simple direction for the disinfection of stables extracted from last year's report may be useful in dealing with glanders:—

‘When the buildings are modern and properly constructed as to air space, light, drainage and ventilation, disinfection is a simple matter.

‘When, however, the stable building is old, perhaps a utilization of some old wooden structure for housing animals, or the make-shift erections of the pioneer in the west who by force of circumstances has been compelled to provide some sort of shelter which because horses are kept in it is called a stable, it is more difficult.

‘The disinfectant may be gaseous, spray, liquid or solid. The gases most used for disinfection are chlorine and formaldehyde.

‘In using gas for disinfectant purposes it is necessary to remove the animals, and close up tightly the doors, windows and ventilators.

‘To generate chlorine gas, place, say, 8 ounces of common salt with which an ounce of black oxide of manganese has been mixed, in an earthenware plate, then pour three ounces of sulphuric acid over the mixture and stir, when chlorine gas will be evolved. Care must be taken not to inhale any of the fumes as they are very irritant to the bron-

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chial tubes—several plates may be used according to the size and form of the stable. It should be left closed for four hours when it may be opened and air and light freely admitted for several hours before animals are returned to it.

‘Vaporized formaldehyde is extensively used for disinfecting houses, it is disengaged by a special apparatus and is introduced to a room or building by a rubber tube passed through a key-hole.

‘Steam is very effective where it can be conveniently furnished.

‘The liquids used for disinfection are: solutions of corrosive sublimate which while much used in human practice are too dangerous to be employed for disinfection of stables or byres, solutions of carbolic acid, creolin, sulpho naphthol or sanitas, may be used either in watery solutions or in combination with lime wash.

‘Reliable disinfection may be obtained by using a spraying pump and applying a lime wash to every five gallons of which a pound of commercial carbolic acid is added, forcing it into every corner, crack or crevice of the walls, stall, divisions and floors.

‘The solids used are lime, chloride of lime, and carbolate of lime which are useful for sprinkling floors or mixing with composts and manure heaps.

‘More powerful chemicals are prescribed for disinfection, but in selecting the above we have considered efficiency, safety, cheapness and facility in procuring as most country druggists can supply them.’

Insidious and incurable as this disease undoubtedly is, the facility with which the infective properties of the *bacillus mallei* are destroyed by sunlight and dry air as well as by such measures as above suggested, and diagnosis by the mallein test being almost absolutely reliable, it is quite within the possibilities that this disease may be completely eradicated, and if fresh importations are prevented, our horses will have a clean bill of health which will greatly enhance their value and ensure a ready sale.

MALARIAL OR SWAMP FEVER IN HORSES.

In last year’s annual report a letter from an extensive horse-breeder at Battleford was published and some explanations given as to the nature and prevention of equine typhoid. During the past summer reports of serious losses of horses of all ages reached the department from the low lying farm lands along the Calgary and Edmonton Railroad, supposed to be from the same disease.

I visited the infected district on the 14th September with a view to discover if possible the cause of the losses, which I found to have been considerable, and that they occur most frequently if not entirely during the fly season, viz.: the months of July, August and September. In nearly all cases the animals pastured on swale land, although some state that the disease has been seen in stabled horses also. The symptoms were, dulness, drooping of the ears, weakness, rapid loss of flesh, in some cases costiveness at the beginning followed by diarrhoea, swelling between the forelegs and along the belly, the pulse weak and soft, excessive thirst towards the termination. They are said to eat well to the end, some were said to have bled at the nose.

In two post mortem examinations which I held, I found the evidences of disease confined to the intestinal tract, the stomach in each was congested and studded by ecchymosis both externally and internally. The petechiæ were abundant along the whole alimentary tract and in one subject I found gangrene of a portion of the large intestines and inflammation of the villous coat of the stomach and mucus membrane of the intestines.

The kidneys were swollen and like the intestine studded by petechiæ. The liver was soft and friable.

A. McGee was said to have lost all his horses, J. Alwyn, thirty or forty; Mr. Mitchell, fourteen, &c.

The mortality at Olds, Innisfail and other places has been equally severe.

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I found, however, that all of the deaths could not be justly attributed to this cause.

One horse which was included in the list had been driven thirty miles over very bad mud roads at a quick pace, took colic, rallied, had a relapse in a few days and died from inflammation of the bowels. Another had been fed on unthreshed barley one day and unthreshed wheat the next, he died from intestinal inflammation. Another, on inquiry, I found died from a broken neck. A Mr. Dick had lost three horses, one was sick from January till April, all died from different causes. However, I found evidence enough of extensive mortality among horses in this section due to some cause which may be difficult to determine.

On making inquiries I found that for at least three seasons the rainfall had been unusual and the sloughs were all full, the slough grass rank, and mosquitoes very numerous.

Recent investigations in connection with malarial fevers, especially yellow fever, have shown that certain varieties of this fly are unquestionably the inoculating agents in these and probably other diseases. When people were housed in mosquito proof houses, made so by being covered by wire netting, they could cohabit with yellow fever patients and not contract the disease; if, however, they were bitten by this special family of mosquito, *Stegomyia Taeniata*, which had fed on a yellow fever patient, they became affected with the disease.*

Just how much mosquitos have to do with producing this equine malarial fever, for such it is, has not yet been determined.

I would suggest that an officer of the department be sent during the midsummer months to investigate this disease on this and other lines, so that we can ascertain definitely the cause, and improve our chances of suggesting a preventive.

In the meantime owners of horses will do well as far as practicable to keep them stabled and protected from mosquitoes and other flies, and especially to keep them away from sloughs and swamps, owners of bands of horses cannot do this, but those who can ought to do it even if at considerable inconvenience to themselves.

MANGE IN CATTLE.

I have pleasure in reporting that mange in cattle which two years ago existed extensively throughout the ranching districts of Alberta has now been eradicated in some of the worst infected localities. By the reports of Mr. R. G. Matthews, secretary of the Western Stock Growers' Association, J. H. G. Bray, secretary treasurer Medicine Hat Stock Growers' Association, Inspector J. F. Burnett, N.W.M. Police, Macleod, John C. Hargrave, D.V.S., Dominion inspector at Medicine Hat, D. Coristine, V.S., Maple Creek, and Commisisoner Perry of the North-west Mounted Police, it will be seen that this disease still exists, although to a much less extent than formerly, yet Coristine reports 140 cases in his district, and Hargrave 75 per cent as being affected on the Red Deer river, and that the ranchers, north of the railroad and east of the river treated about thirty gathered on the fall round-up.

It has been demonstrated that this disease can with a little attention on the part of the cattlemen be completely eradicated and it is to be hoped that the experiences which have been gone through will lead them to treat every case occurring among their herds, not only to cure the affected animals but to prevent them infecting others.

‘WESTERN STOCK GROWERS’ ASSOCIATION, MACLEOD, ALTA.

‘DEAR SIR,—Referring to your letter of the 30th ultimo *re* the existence or otherwise of mange on the range now, I beg to state that I have made inquiries in all directions with following results:—

Willow Creek—One case found on Fall Round-up, a few scattered since.

* ‘American Medicine’ November 23, 1901.

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High River—A few cases found, mostly fat dry cows and steers, but nothing like the number found at same time last year.

Maple Creek—A few cases found on Round-up, but more found since and it is expected they will become more numerous as the cold weather increases.

Medicine Hat—Cases found on Round-up, and on several occasions beef cattle were cut back from shipments.

North Fork—No cases found on Round-up and no report received of its existence in that neighbourhood.

Crane Lake—Four cases found on Round-up, all yearling bulls.

Macleod—One case (a cow belonging to the Indian Department) found on Round-up. No cases since.

Porcupine Hills—No cases found.

Cochrane range—No cases.

This practically covers the ranching country, and you can draw your own conclusions from it. Of course the weather so far this year has been extremely favourable to cattle and the disease may crop up again in the spring, but to all intents and purposes it seems to have disappeared. Scattered individual cases are no doubt occurring but they can be attributed to the fact of stock using the brush for shelter and rubbing on infected trees.

Yours truly,

(Signed) R. G. MATHEWS,
Secretary.

MEDICINE HAT STOCK GROWERS' ASSOCIATION,
STOCK INSPECTOR'S OFFICE,
MEDICINE HAT, N.W.T.

'DEAR SIR,—I beg to acknowledge receipt of your letter of the 30th ult, *re* mange, and in reply would say that from careful inquiries and my own personal observations as stock inspector, my opinion is that mange is still prevalent on the ranges of this district. We have not seen many cases in the stock yards, only a very few having been cut back by Dr. Hargrave, but it was found on the Round-up and exists on some ranches though not to any serious extent, and with proper care I have no doubt it will soon be eradicated.

I remain, dear sir,

Yours respectfully,

(Signed) J. H. G. BRAY.'

MEDICINE HAT.

'DEAR SIR,—Referring to your inquiry regarding mange I have delayed answering, as I was going out among some of the ranchers and would be able to make a better report.

It still continues to exist among some of the herds, but a great many of the ranchers say that they have seen no sign of it since last winter and some claim that they never had it. On the Red Deer river about 75 per cent are affected and the ranchers north of the railroad and east of the river treated about 30 head gathered on the fall round-up. It would appear that the smaller ranchers who are better able to keep their herds free from it have done so, but that, with one or two exceptions, all the larger stockmen still have it in their herds, but to a less extent than ever before.

(Signed) JOHN C. HARGRAVE,
Government Veterinary Surgeon.

In his report, Veterinary Inspector Burnett, N.W. Mounted Police, Macleod, says:—

‘Mange, one of the most dreaded diseases of cattle, appears to be fast disappearing from the herds, that occasional cases are seen, I have no doubt, but the fact that the owners have been taking them up for the past two years and treating them at home precludes the possibility of my seeing them, and while I do not think that this method of treatment fully accounts for the gradual disappearance of the disease, it has no doubt not only exerted considerable influence in the eradication of the malady, but has been the means whereby a great many fat cattle have been shipped that otherwise could not have been.’

ACTINOMYCOSIS (*Lumpy Jaw*).

By referring to the inspectors’ reports it will be seen that this disease (which is due to the ray fungus), is gradually but surely decreasing. At the shipping ports it is rarely seen now—only two animals were rejected for export on account of it as against nine the previous year and twenty-nine two years ago—and reports from inspectors show equally satisfactory results.

For information as to its nature and treatment see last year’s report, page 73.

HOG CHOLERA.

I regret to have to report that hog cholera again broke out in some of the localities in which it had previously existed in the western peninsula of Ontario, traceable in most cases to infection derived from the Indian reserve, Walpole island. With remarkable regularity it was found that the outbreaks followed the course of the river, into which dead hogs had been thrown ; this was noticed also when the previous outbreaks occurred in that district.

NUMBER OF FARMS ON WHICH FRESH CASES HAVE BEEN FOUND.

Western Peninsula of Ontario (Counties of Kent, Essex and Lambton)	90
Toronto district	2
Burford district	6
Ottawa district	1
Total	99

NUMBER OF HOGS SLAUGHTERED.

Twelve months, ending October 31, 1901 :

Hogs slaughtered—Diseased	597
“ Contact	701
Total	1,298
Indemnity	\$ 6,996 42

It will be seen that only nine farms were quarantined outside of Kent, Essex and Lambton.

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I have pleasure in reporting that the disease is again non-existent so far as reports show, and it is to be hoped that those responsible for the Indians will see that the practice of throwing carcasses into the river is prevented in future. All carcasses should be burned as the surest means for destroying infection through them.

It is gratifying to notice from the reports of the inspectors that the decrease of mortality from the disease is 'due to a large extent to the fact that the farmers are becoming better posted as to preventive measures and are more willing to report cases promptly before infection has time to spread' (Perdue's Report). 'I find that the farmers are more anxious to report disease in their farms and are more thorough in cleansing and disinfecting the premises' (G. W. Orchard's Report). Inspector Jos. Kime, Chatham, reports as follows: 'For eleven months there was not a case of swine plague or hog cholera came under my notice until a butcher introduced it again by store hogs brought to his slaughter-house.'

Clearly the disease can be eradicated and its reintroduction prevented if interested parties would but carry out the means suggested in the bulletins and regulations issued by the department for their benefit.

PICTOU CATTLE DISEASE.

This disease still continues to appear among the dairy cattle of Nova Scotia, confined to the limited area where it has been seen for forty years. Its causation still remains a mystery; yet it does not extend beyond the infected district. Cattle have been removed from this district to other places without the disease appearing or being introduced into these new districts.

The report this year shows a marked falling off in the number of deaths.

	No. Slaughtered.	Amount Paid.
1899-1900.....	149	\$1,151 99
1900-1901.....	91	723 66
Decrease.....	58	\$ 428 33

INSPECTION OF STOCK YARDS AND CARS.

Mr. Auger, inspector of stock yards and cars, reports improvements in the cleaning of cars.

He travelled as far west as Victoria, B.C., and reports improvements in the stock yards en route, and a disposition on the part of railway officials to meet the requirements of the public in this respect.

Both Mr. Auger and the local veterinary inspector, Mr. Frink, report very highly of the new yards built by the Canadian Pacific Railway at East St. John, N.B., which can accommodate under cover a thousand head of cattle. This improvement was much needed, and will prove not only a boon to cattle shippers, but will be the means of increasing the live stock shipments from St. John.

SHEEP SCAB.

I regret to report that slight outbreaks of sheep scab occurred in the counties of Peel, Victoria and Ontario, in which nineteen farms were quarantined, and the sheep treated by dipping, the premises being thoroughly disinfected. The outbreaks were completely controlled, and so far as is known to the department, no sheep scab exists at this date in any part of the Dominion.

Table showing the number of farms quarantined for Sheep Scab, twelve months ending October 31, 1901.

Number of Farms on which Fresh Outbreaks have been Found :—

Peel County, Ont.	3
Victoria County, Ont.	4
Ontario County, Ont.	12
	<hr/>
	19
	<hr/>
Number of sheep slaughtered	2
Indemnity	\$3 66

The probability of an immediate extension of sheep-breeding in the Territories, and consequently extensive importations from Montana and Dakota is evident from the numbers already brought in ; special instructions were given to inspectors to see that the most thorough inspections were made, corrals for the purpose being furnished by the department at certain points. They were also authorized to detain sheep for a second inspection whenever they considered it necessary ; so far, no scab has been found in any of the importations. Breeders cannot be too careful about the selection of sheep in Montana.

ANTHRAX AND SYMPTOMATIC ANTHRAX.

By reference to the reports of inspectors it will be seen that outbreaks of anthrax and symptomatic anthrax (black leg), are becoming more prevalent—the former is reported to have been dealt with at Millbrooke, Ont., Lunenburg, Ont., Oznabrook, Ont., at New Glasgow, P.Q., Chateau Richer, P.Q., at Maple Creek, Regina, Medicine Hat and Swift Current, in the North-west Territories; and the latter at Clarence Creek, P.Q., Niagara, Ont. and Vancouver, B.C.

The outbreak of anthrax in sheep at Swift Current proved to be a very serious affair, occurring as it did in a flock of about 16,000 sheep belonging to the Canadian Land and Ranche Company. Owing to the difficulty in obtaining a sufficient supply of freshly prepared anthrax vaccine due to this vaccine requiring to be used within a few days of its being prepared and none of the firms who manufacture immunizing lymphs, or vaccines keeping it on hand and the distance requiring about four days for it to reach Swift Current, delays were encountered and unfortunately owing to faulty lymph supplied by one firm, considerable mortality resulted from its use, while the results of using that supplied by the Pasteur Vaccine Company were very satisfactory. About 3,000 died in all, of which 475 died subsequent to vaccination, and one cow and eight horses died from the disease at the same place. The survivors were progressively moved off the infected area, which was close-quarantined and stock of all kinds prevented from entering on it. All carcasses were burned, and instructions were given to burn the grasses before any stock are allowed on to it again. The use of the Pasteur vaccine demonstrated its efficacy to produce immunity. Equal success attended the use of this vaccine in the eastern outbreak; at Oznabrook Dr. Moore vaccinated 273 cattle with most satisfactory results, Mr. Higginson, V.S., Rockland, vaccinated several hundred at Lunenburg with equal results.

Blackleg vaccine has been extensively employed for immunization in all parts of the Dominion, especially in the Territories and British Columbia.

All carcasses of animals dying from this disease are ordered to be burned and every proper precaution taken to prevent recurrences.

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A bulletin on anthrax and symptomatic anthrax will shortly be issued and freely circulated throughout the country containing correct information about these diseases. I trust it will be carefully read and the suggestions contained therein put into practice ; it is herewith appended.

ANTHRAX.

This disease, which is much dreaded in European countries on account of the sudden and serious losses which it occasions, has, fortunately, been scarcely known to exist in Canada till the present summer (1901) when several rather serious outbreaks occurred, as will be seen by referring to the reports of the Cattle Quarantine Inspectors published as appendices to the report of the Minister of Agriculture.

This bulletin is published with the object of informing stockmen of the nature of this disease and its cause, of how it is spread among herds, and of the measures necessary for its prevention. A careful study of it will convince the reader that if the disease is left unchecked and preventive precautions are neglected, not only may present serious losses be experienced, but the land itself may be rendered infective for fifty or a hundred years; already certain farms and districts both in the east and in the west are known to be anthrax infected, and the disease breaks out on them at irregular periods, the animals dying with alarming suddenness.

It is well known that the spores of the bacillus in some way get into the ground, and that they may remain there in a dormant state for many years. According to Crookshank: 'By some means or other the spores contaminate the grass, and hay imported from an anthrax infected district may start the disease at a farm on which it had never been known to occur.'

'The skin, hair, wool, hoofs and horns of infected animals, if soiled with blood, are contaminated by the bacillus.' It is an infection which is the very reverse of that of contagious pleuro-pneumonia, which requires the contact of living diseased with living healthy animals, whereas anthrax infection rarely takes place from living animals, unless the blood containing bacilli is allowed to contaminate the food, or inoculate a wounded surface. It is the carcass that is to be dreaded as the source of infection.

ANTHRAX BACILLUS.

The immediate cause of the disease is the entrance into the bodies of healthy animals of rod-shaped bacilli or their spores, either in food or water or by inoculation through an abraded surface or open wound.

The bacilli themselves are easily killed, but their spores resist ordinary germicides and even such degrees of heat as kill all other spores of bacteria.

The effect of the entrance of these virulent spores into an animal body, by whatever channel they enter, is to soon destroy the subject by their rapid indefinite multiplication and their pernicious action on the blood, which they deprive of its life-sustaining properties by absorbing the oxygen and obstructing the minute capillary circulation, death taking place in most cases instantaneously and without noticeable symptoms of illness.

Bollinger recognizes three different forms of anthrax as affecting the domestic animals:

1. Apoplectiform, which kills in from a few minutes to several hours.
2. Acute anthrax, lasting from a few hours to a few days.
3. Sub-acute forms of anthrax; all cases of a longer duration.

In the first and second forms the disease runs its course with remarkable rapidity, and animals so affected frequently die as if stricken by lightning, without having given rise to any previous suspicions regarding their condition.

In the third form the mortality exceeds 70 per cent.

The disease seldom affords opportunities for even experimental treatment.

In cattle and sheep the post mortem lesions consist of a black tar-like appearance of the blood which teems with bacilli, ecchymoses in most of the internal organs, especially the small intestines, mediastinum and mesentery, with great enlargement of the spleen which is distended with black tar-like blood. This organ is found in this condition in all cases of internal anthrax.

External anthrax is occasionally seen in horses and sheep, rarely in cattle, and is usually due to inoculation by flies. It is attended by local swelling which is hard and painful, and spreads rapidly to the surrounding parts, general infection takes place and the animal usually dies, the post mortem lesions being similar to those of intestinal anthrax.

The manner in which anthrax is spread should be well known. The bacilli require oxygen to sporulate, hence if the carcass is cut open and exposed to the air, spores form readily in the blood, and whatever is smeared with it immediately becomes infective; and ignorance of this fact is accountable for the careless disposal of carcasses of animals which have died from anthrax. It is too frequently the practice of farmers and others to drag a dead animal away from the buildings, perhaps across a pasture or hay field, and leave it unburied or only partially covered in a swamp or wood where it is easily reached by dogs and vermin, by which portions are dragged across fields, smearing the ground or grasses with spores of the bacillus.

PREVENTIVE MEASURES.

On no account should the body of an animal which has died of anthrax be opened or skinned. If the blood is confined within the body, and discharges from the natural openings prevented by plugging them with tow saturated with a 20 per cent solution of carbolic acid, and the carcass carried, not dragged, to the place prepared for burning it, no infection can take place from it. As a precautionary measure, however, the stall and surroundings where the death occurred should be thoroughly disinfected, as well as the cart or wagon which it has been carried in.

By all means burn the carcass—and bury the ashes deeply with lime. Just think of the risks that are run by any carelessness in dealing with a carcass from which millions of millions of infective spores may be given off, and in some way reach the surface years after to infect and destroy cattle, sheep, swine and horses, and enormously reduce the value of the farm. Some authors state that horses are not particularly susceptible, but such is not our experience in Canada, for in nearly every outbreak we have had to deal with, horses have died from it, as well as cattle and sheep.

IMMUNIZATION AGAINST ANTHRAX INFECTION.

The method of vaccination by an attenuated virus as a preventive of anthrax, discovered by Pasteur, has been extensively employed, especially in France and Russia, for many years, and for some years back in the United States and Canada. So long as the vaccine could not be obtained within a few days of being manufactured, its use was found to be impracticable, as it will not keep long under any conditions, and deaths have been produced by using vaccine when too long kept, or where it has been carelessly prepared and tested. Two cultures of different degrees of virulence are used, Vaccine No. 1 kills mice, but not guinea pigs; Vaccine No. 2 kills guinea pigs, but not rabbits.

The sheep, cattle, swine or horses to be inoculated are given by subcutaneous injection a dose of No. 1 Vaccine, and in 12 days thereafter a dose of No. 2.

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Protective lymphs are supplied by the manufacturers, the Pasteur Institute, Chicago, and Messrs. Parke, Davis & Co., Walkerville, Ont. Printed directions are given with these.

During the past summer protective inoculation has been extensively employed with satisfactory results in several outbreaks, both in the east and west; fourteen thousand sheep on one ranch having been inoculated by officers of the department.

The vaccination, however, should not be undertaken by any inexperienced person, and on no account should old or doubtful lymph be used.

SYMPTOMATIC ANTHRAX.

Black leg, or black quarter, occurs occasionally in various parts of Canada from ocean to ocean. It is a disease which principally affects young and thriving cattle, and is seen more rarely in sheep and goats. It occurs at irregular intervals in certain districts, especially during the summer months, sometimes extensively, and at other times causing the deaths of only a few fat calves here and there within a limited area; it will prevail for a few months, especially when the calves are thriving best, and then disappear perhaps for some years. It is, like anthrax, a disease the germs of which emanate from the soil, but it is also seen in stabled animals when fed on hay grown on infected land.

It also is a bacterial disease, but although the bacillus is a spore bearer it is not identical with that of anthrax, and can be distinguished by being shorter and having rounded ends; the bacilli do not form chains as do those of anthrax, besides they have flagellæ having the power of movement, and, being anærobic, cannot be cultivated in an atmosphere containing oxygen. They form spores which are usually seen at the end of the rod, are ovoid in form, and are larger than those of anthrax. The bacilli are not found in the blood during life, but may be found in it after oxygenation ceases when death occurs. As the name indicates, the pathological manifestations are mostly confined to the quarter; which may be the hind or may be the fore, the calf becomes lame and unable to move the limb, except in a dragging manner, the quarter swells and the swelling crackles under the hand as if it contained confined air or gas. The animals may die suddenly or linger from twelve to forty-eight hours. Treatment is useless, and the remarks made as to the disposal of carcasses of animals dying of anthrax apply also to animals dying of black leg.

Setons in the dewlap are empirically recommended, but are of doubtful utility. It is well to check too rapid fattening by moving the calves to poorer pasture, and by giving them exercise by driving, and they should be prevented from eating grass grown over the graves of dead cattle; all graves of dead animals should be fenced.

Vaccination by means of an attenuated virus of the disease is now extensively and successfully practiced throughout Canada, more especially in the stock-raising districts of the west.

Vaccinating outfits can be procured from the Pasteur Vaccine Co., Limited, 56 Fifth Avenue, Chicago, or Messrs. Parke, Davis & Co., Walkerville, Ont., who manufacture the vaccines and furnish full directions for using them.

The vaccines are of two kinds, viz., single vaccine requiring only one application, and double vaccine requiring two application; first and second lymph.

The double vaccine especially has proved highly successful in the immunization of young stock both in the United States and Canada. Another form of vaccination is that should it be found as effective as the lymph injection it will prove a great boon in saving labour to the owners of large herds of range cattle.

Cattle and horses are usually vaccinated on the neck or shoulder; sheep on the inside of the thigh. Vaccination may be done at any time, but the spring is the most favourable, and it is more necessary then as the disease prevails most during early summer.

It should be done at any time should an outbreak be discovered in a herd.
The immunization lasts for about twelve months.

Young bulls brought on to ranches from the east should be vaccinated before being turned out, and in districts where the disease is known to have existed, eastern stockers of a cord saturated in the vaccine, which is inserted but once by means of a needle; should be similarly protected.

TUBERCULOSIS.

Table showing the number of cattle tested for tuberculosis in each province for twelve months, ending October 31, 1901 :

Ontario.....	6,786	162
Prince Edward Island.....	100	..
Quebec.....	2,177	115
New Brunswick.....	208	3
Nova Scotia.....	309	14
British Columbia.....	92	9
Manitoba.....	464	33
North-west Territories.....	17	1
	<hr/> 10,153	<hr/> 337

It will be seen that the number tested during the past twelve months is less by 7,632 than the number tested during the preceding twelve months. This is due to testing having been stopped during the summer months, owing to the loss of time and inconvenience experienced by inspectors on account of the cattle being in the fields, and the owners busy, for which reasons it was decided not to test till October and during the winter months.

By referring to Dr. Moore's report it will be seen that he tested 630 head, 123 of which were tuberculous and 5 suspicious, but he states that 92 of the above diseased animals were from three herds, 57 being out of a herd of 72 dairy cattle, 18 out of a herd of 21, and 17 out of a herd of 20.

If we leave out these three plague-smitten herds, we find that the percentage of reactions is extremely small.

The subject of tuberculosis and tuberculin testing has received much attention, and has been fully discussed in the press and on the platform during the past year ; animated discussions have been carried on in the newspapers and agricultural press, congresses have been held at Ottawa, New York and London to which were invited those supposed to be best informed, the result being the publication of a vast amount of information bearing on this important subject.

It has been stated that tuberculin was a means of spreading tuberculosis by producing it. To prove that this is erroneous, Dr. Higgins was furnished with samples of tuberculin, obtained from Koch's laboratory (as used by the cattle quarantine service), from the Bureau of Animal Industry at Washington, from Parke, Davis & Company, and from the Guelph Agricultural College.

With each of these samples three guinea pigs were inoculated, and in no case was there a reaction, but in every instance where the same tuberculin was injected into animals known to be tuberculous definite and characteristic reaction resulted, thus showing that the statement was incorrect. (For details of this experiment see Dr. Higgins's report.)

Statements have been made by the opponents of tuberculin as a test, that it produces abortion in pregnant cows, impotency in bulls, interfered with the general health, and was unreliable as a test. If the reader will turn to the paper read by the

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writer before 'The Animals Section of the British Congress' on tuberculosis, reproduced here, he will find the strongest evidence adduced to disprove these statements.

The following deductions in this connection were accepted by this Section without a dissenting voice.

(a.) Tuberculosis is essentially a contagious disease and ought to be classified and acknowledged by every country and state in the world as such.

(b) It is insidious in its character, and in only a few cases, comparatively, can it be diagnosed by physical examination, but in tuberculin we have a safe and reliable test by which even latent cases can be diagnosed.

(c.) That tuberculin is harmless ; it does not produce abortion in pregnant cows, impotency in bulls, or in any way produce any injurious effect on animals tested by it.

THE BRITISH CONGRESS ON TUBERCULOSIS FOR THE PREVENTION OF CONSUMPTION.

This vast assemblage of scientists, numbering about 2,700 representatives from all parts of the Empire and foreign countries, met at London under the patronage of King Edward VII. The opening meeting was held in St. James's Hall, Piccadilly, on July 22.

Field-Marshal, H.R.H. the Duke of Cambridge, president, in the chair, opened the congress on behalf of His Majesty the King.

The congress was divided into four sections, each having a president, several vice-presidents and honorary secretaries.

The membership was composed of honorary members, delegates and members.

Honorary members were persons nominated by any foreign government or university, or by the executive committee, delegated and ordinary members were other persons, British, colonial or foreign, who wished to attend, including representatives from governments or institutions within the British Empire.

SECTION I.

(State and Municipal.)

President—The Right Hon. Sir Herbert Maxwell, Bart., M.P., F.R.S.

The meetings of this section were held daily at St. George's Hall, Langham Place, and comprised five divisions, viz.:—

Division I.—Statistical.

II.—The notification of tuberculosis ; Prevention of tuberculosis during childhood.

III.—Influence of housing and aggregation ; The control of meat supply.

IV.—The international aspect of tuberculosis ; Control of milk supplies.

V.—The provision of sanatoria ; The role of hospitals and dispensaries for consumption in the prevention of phthisis.

SECTION II.

(Medical, including Climatology and Sanatoria ; meetings in the Royal Medical and Chirurgical Society's rooms, 20 Hanover Square.)

President.—Sir Richard Douglas Powell, Bart., K.C.V.O., M.D.

The following subjects were discussed :—

(a) 'What influence has climate on the treatment of consumption, and how far can cases be grouped for treatment in certain climates.'

(b) 'The therapeutic and diagnostic value of tuberculin in human tuberculosis.'

(c) 'Sanatoria for consumption.'

Besides these, numerous valuable papers were read and demonstrations given.

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SECTION III.

(Pathology, including Bacteriology ; Meetings in Queen's Hall.)

President.—Prof. G. Sims Woodhead, M.D., F.R.S.E.

The following subjects were introduced for discussion :—

1. 'The Morphological and Physiological Variations of the Bacillus Tuberculosis and its relations (a) to other acid-proof bacilli ; (b) to the ray fungus and other streptothrices.'

2. 'Tuberculin.'

3. 'Varieties of Tuberculosis, Morbid Anatomy and Histology.'

4. 'Mixed Infection in Tuberculosis.'

And a large number of other papers on 'Tubercle Bacilli,' 'Infectivity of Milk,' &c.

SECTION IV.

(Veterinary—Tuberculosis in Animals ; Meetings in Marlborough Hall (Polytechnic), Regent Street.)

President.—Sir George T. Brown, C.B.

The following subjects were discussed :—

1. 'The Diagnosis of Tuberculosis in Animals during Life.'

2. 'Tuberculosis and the Milk Supply.'

3. 'Tuberculosis and the Meat Supply.'

4. 'The Legislation and other Measures necessary to combat Tuberculosis.'

The following distinguished foreigners took part in the discussions in this section :

Professor Nocard, of the Alfort Veterinary School.

" Bang, of Denmark Veterinary School.

" Arlong, of the Lyons Veterinary School.

" Thomassen, of Utrecht Veterinary School.

" Malm, delegate from the Swedish Government.

So far as this report is concerned, the interest largely centres in the discussion as to the identity of human and bovine tubercle bacilli, and the intercommunicability of tuberculosis between men and animals, and the paper read by Prof. Robert Koch and replied to by Professor John McFadyean.

For eighteen years the entire medical and veterinary professions have not doubted that consumption in children and old or weak persons was frequently produced by the ingestion or inhalation of bovine tubercle bacilli, but more especially by means of milk from diseased udders of cows.

Recently, however, Prof. Theobald Smith and those making similar investigations and experiments, have concluded that, although similar, the two bacilli were not identical, the chief difference being observed in their relative virulence ; this we confirmed by experiments made under my direction by Dr. C. H. Higgins, at Outremont Station in 1899 (see report for that year). We found that when bovine tubercle was injected into the udder of one cow and human tubercle into that of another cow, the resulting swelling was greatest from the bovine cultures. Two healthy heifers were inoculated, one with bovine tubercle in the right lung, the other with human in the left ; the former died from generalized tuberculosis on the forty-second day, whereas the latter, inoculated with human tubercle, although she contracted the disease, showed but slight clinical evidence of it.

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Five guinea pigs inoculated with the bovine cultures of tubercle died respectively on the 14th, 15th, 20th, 30th and 35th days: Three in which human cultures were used died in 18, 23 and 35 days generalized tuberculosis being found in each case.

In rabbits, five inoculated with bovine cultures died in 36, 70, 74 and 90 days, one surviving 3½ months. Of three inoculated with human cultures one only contracted the disease dying in 52 days, the other two being alive after two months.

In chickens inoculation with both bovine and human cultures failed to produce the disease.

Thus it will be seen that for some time it was well known to those working on this subject that bovine was much more virulent than human tubercle, yet no one had got results which justified them in coming to the conclusion announced by Prof. Koch, which centralized the whole interest of the Congress on his paper, viz.: the announcement that, 'if susceptibility really exists, the infection of human beings by milk or flesh of tubercular cattle, is but a very rare occurrence ;' an announcement which fell like a bomb shell in the Congress which was not prepared for it and which was not accepted as correct.

Able replies were made by Lord Lister, Prof. Nocard, Prof. Bang and more particularly Prof. John McFadyean, Dean of the Royal Veterinary College, London, and the following resolution was unanimously passed; that 'in the opinion of this Congress Medical Health Officers should use the powers at their disposal and relax no effort to prevent the spread of tuberculosis by milk and meat.'

As the subject is of much interest as a public health question, although of minor importance so far as its virulence among cattle and other domestic animals is concerned, of which there is no doubt, whatever, I take the liberty of making the following extracts from both their papers.

PROFESSOR ROBERT KOCH'S PAPER.

'Great importance used to be attached to the hereditary transmission of tuberculosis. Now, however, it has been demonstrated by thorough investigation that, although hereditary tuberculosis is not absolutely non-existent, it is nevertheless extremely rare, and we are at liberty, in considering our practical measures, to leave this form of origination entirely out of account.

'But another possibility of tubercular infection arises, as is generally assumed, in the transmission of the germs of the disease from tubercular animals to man. This manner of infection is generally regarded now a days as proved, and as so frequent that it is even looked upon by not a few as the most important, and the most rigorous measures are demanded against it. In this Congress also the discussion of the danger with which the tuberculosis of animals threatens man will play an important part. Now, as my investigations have led me to form an opinion deviating from that which is generally accepted, I beg your permission, in consideration of the great importance of this question, to discuss it a little more thoroughly.

'Genuine tuberculosis has hitherto been observed in almost all domestic animals, and most frequently in poultry and cattle. The tuberculosis of poultry, however, differs so much from human tuberculosis, that we may leave it out of account as a possible source of infection for man. So, strictly speaking, the only kind of animal tuberculosis remaining to be considered is the tuberculosis of cattle, which, if really transferable to man, would indeed have frequent opportunities of infecting human beings through the drinking of the milk and the eating of the flesh of diseased animals.

'Even in my first circumstantial publication on the etiology of tuberculosis, I expressed myself regarding the identity of human tuberculosis and bovine tuberculosis with reserve. Proved facts which would have enabled me sharply to distinguish these two forms of the disease were not then at my disposal, but sure proofs of their absolute identity were equally undiscoverable, and I therefore had to leave this question un-

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decided. In order to decide it, I have repeatedly resumed the investigations relating to it, but so long as I experimented on small animals, such as rabbits and guinea pigs, I failed to arrive at any satisfactory result, though indications which rendered the difference of the two forms of tuberculosis probable were not wanting. Not till the complaisance of the Ministry of Agriculture enabled me to experiment on cattle, the only animals really suitable for these investigations, did I arrive at absolutely conclusive results. Of the experiments which I have carried out during the last two years along with Professor Schutz, of the Veterinary College, in Berlin, I will tell you briefly some of the most important.

‘A number of young cattle which had stood the tuberculin test, and might therefore be regarded as free from tuberculosis, were infected in various ways with pure cultures of tubercle-bacilli taken from cases of human tuberculosis; some of them got the tubercular sputum of consumptive patients direct. In some cases the tubercle-bacilli or the sputum were injected under the skin, in others into the peritoneal cavity, in others into the jugular vein. Six animals were fed with tubercular sputum almost daily for seven or eight months; four repeatedly inhaled great quantities of bacilli, which were distributed in water, and scattered with it in the form of spray. None of these cattle (there were nineteen of them) showed any symptoms of disease, and they gained considerably in weight. From six to eight months after the beginning of the experiments they were killed. In their internal organs not a trace of tuberculosis was found. Only at the places where the injections had been made small suppurative foci had formed, in which few tubercle-bacilli could be found. This is exactly what one finds when one injects dead tubercle-bacilli under the skin of animals liable to contagion. So the animals we experimented on were affected by the living bacilli of human tuberculosis exactly as they would have been by dead ones; they were absolutely insusceptible to them.

‘The result was utterly different, however, when the same experiment was made on cattle free from tuberculosis with tubercle-bacilli that came from the lungs of an animal suffering from bovine tuberculosis. After an incubation period of about a week the severest tubercular disorders of the internal organs broke out in all the infected animals. It was all one whether the infecting matter had been injected only under the skin or into the peritoneal cavity or the vascular system. High fever set in, and the animals became weak and lean; some of them died after a month and a half to two months, others were killed in a miserably sick condition after three months. After death extensive tubercular infiltrations were found at the place where the injections had been made, and in the neighbouring lymphatic glands, and also far advanced alterations of the internal organs, especially the lungs and the spleen. In the cases in which the injection had been made into the peritoneal cavity the tubercular growths which are so characteristic of bovine tuberculosis were found on the omentum and peritoneum. In short, the cattle proved just as susceptible to infection by the bacillus of bovine tuberculosis as they had proved insusceptible to infection by the bacillus of human tuberculosis. I wish only to add that preparations of the organs of the cattle which were artificially infected with bovine tuberculosis in these experiments are exhibited in the Museum of Pathology and Bacteriology.

‘An almost equally striking distinction between human and bovine tuberculosis was brought to light by a feeding experiment with swine. Six young swine were fed daily for three months with the tubercular sputum of consumptive patients. Six other swine received bacilli of bovine tuberculosis with their food daily for the same period. The animals that were fed with sputum remained healthy and grew lustily, whereas those that were fed with the bacilli of bovine tuberculosis soon became sickly, were stunted in their growth, and half of them died. After three months and a half the surviving swine were all killed and examined. Among the animals that had been fed with sputum no trace of tuberculosis was found, except here and there little nodules in the lymphatic glands of the neck, and in one case a few gray nodules in the lungs. The animals, on the other hand, which had eaten bacilli of bovine tuber-

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culosis had, without exception (just as in the cattle experiment), severe tubercular diseases, especially tubercular infiltration of the greatly enlarged lymphatic glands of the neck and of the mesenteric glands, and also extensive tuberculosis of the lungs and the spleen.

‘The difference between human and bovine tuberculosis appeared not less strikingly in a similar experiment with asses, sheep and goats, into whose vascular system the two kinds of tubercle-bacilli were injected.

‘Our experiments, I must add, are not the only ones that have led to this result. If one studies the older literature of the subject, and collates the reports of the numerous experiments that were made in former times by Chauveau, Gunther and Harms, Bollinger and others, who fed calves, swine and goats with tubercular material, one finds that the animals were fed with the milk and pieces of the lungs of tubercular cattle always fell ill of tuberculosis, whereas those that received human material with their food did not. Comparative investigations regarding human and bovine tuberculosis have been made very recently in North America by Smith, Dinwiddie and Frothingham, and their result agreed with that of ours. The unambiguous and absolutely conclusive result of our experiments is due to the fact that we chose methods of infection which exclude all sources of error, and carefully avoided everything connected with the stalling, feeding, and tending of the animals that might have a disturbing effect on the experiments.

‘Considering all these facts, I feel justified in maintaining that human tuberculosis differs from bovine, and cannot be transmitted to cattle. It seems to me very desirable, however, that these experiments should be repeated elsewhere, in order that all doubt as to the correctness of my assertion may be removed.

‘I wish only to add, that, owing to the great importance of this matter, the German government has appointed a commission to make further inquiries on the subject.

‘But, now, how is it with the susceptibility of man to bovine tuberculosis? This question is far more important to us than that of the susceptibility of cattle to human tuberculosis, highly important as that is too. It is impossible to give this question a direct answer, because, of course, the experimental investigation of it with human beings is out of the question. Indirectly, however, we can try to approach it. It is well known that the milk and butter consumed in great cities very often contain large quantities of the bacilli of bovine tuberculosis in a living condition, as the numerous infection-experiments with such dairy products on animals have proved. Most of the inhabitants of such cities daily consume such living and perfectly virulent bacilli of bovine tuberculosis, and unintentionally carry out the experiment which we are not at liberty to make. If the bacilli of bovine tuberculosis were able to infect human beings, many cases of tuberculosis caused by the consumption of alimenta containing tubercle bacilli could not but occur among the inhabitants of great cities, especially the children. And most medical men believe that this is actually the case.

‘In reality, however, it is not so. That a case of tuberculosis has been caused by alimenta can be assumed with certainty only when the intestine suffers first, *i.e.*, when a so-called primary tuberculosis of the intestine is found. But such cases are extremely rare. Among many cases of tuberculosis examined after death, I myself remember having seen primary tuberculosis of the intestine only twice. Among the great post-mortem material of the Charité Hospital in Berlin, ten cases of primary tuberculosis of the intestine occurred in five years. Among 933 cases of tuberculosis in children at the Emperor and Empress Frederick’s Hospital for Children, Baginsky never found tuberculosis of the intestine without simultaneous disease of the lungs and the bronchial glands. Among 3,104 post-mortems of tubercular children, Biedert observed only sixteen cases of primary tuberculosis of the intestine. I could cite from the literature of the subject many more statistics of the same kind, all indubitably showing that primary tuberculosis of the intestine, especially among children, is a comparatively rare disease, and of these few cases that have been enumerated, it is by no means certain that they were due to infection by bovine tuberculosis. It is just as likely that

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they were caused by the widely propagated bacilli of human tuberculosis, which may have got into the digestive canal in some way or other—for instance, by swallowing saliva of the mouth. Hitherto nobody could decide with certainty in such a case whether the tuberculosis of the intestine was of human or animal origin. Now we can diagnose them. All that is necessary is to cultivate in pure culture the tubercle-bacilli found in the tubercular material, and to ascertain whether they belong to bovine tuberculosis by inoculating cattle with them. For this purpose I recommend subcutaneous injection, which yields quite specially characteristic and convincing results. For half a year past I have occupied myself with such investigations, but, owing to the rareness of the disease in question, the number of the cases I have been able to investigate is but small. What has hitherto resulted from this investigation does not speak for the assumption that bovine tuberculosis occurs in man.

‘Though the important question whether man is susceptible to bovine tuberculosis at all is not yet absolutely decided, and will not admit of absolute decision to-day or to-morrow, one is nevertheless already at liberty to say that, if such a susceptibility really exists, the infection of human beings is but a very rare occurrence. I should estimate the extent of infection by the milk and flesh of tubercular cattle, and the butter made of their milk, as hardly greater than that of hereditary transmission, and I therefore do not deem it advisable to take any measures against it.’

PROFESSOR MCFADYEAN'S PAPER.

‘As recently as a few days ago, when I was mentally arranging the material for the paper which I have now the great honour of submitting to this Congress, I was under the impression that it would not be necessary to formally prove that the term tuberculosis as it is now employed by medical men and veterinary surgeons relates to one and the same disease. I thought that I might ask my audience to accept it as proved, and generally admitted, that tuberculosis in man is caused by a single definite species of organism—the tubercle bacillus—that this organism is also the cause of the disease to which veterinary surgeons apply the term tuberculosis in the case of cattle and other domesticated species, and that there therefore existed a *prima facie* case against the germs formed in the bodies of tuberculous animals as a possible source of tuberculous disease in human beings.

‘To-day, however, the position of any one who undertakes to discuss the inter-communicability of human and bovine tuberculosis is very different from what it would have been a week ago, for in the interval the greatest living authority on tuberculosis—the world-renowned discoverer of the tubercle bacillus, and the man to whom we are mainly indebted for our knowledge of the cause of tuberculosis—has declared his conviction that human and bovine tuberculosis are practically two distinct diseases. I do not know how far the reasons assigned by Dr. Koch for the opinion which he now holds on this question may have commended themselves to the members of this Congress, and I am overwhelmed at finding myself in a position which compels me to offer some criticism on the pronouncement of one the latchet of whose shoes I am not worthy to unloose.

‘That bovine and human tuberculosis are identical diseases was generally supposed to have been finally determined by Dr. Koch himself, when he discovered that the human and the bovine lesions contained bacilli that were identical in morphological, tinctorial and cultural characters, and showed that the artificial cultures from both sources produced indistinguishable effects when they were employed to infect a variety of animals. The labours of hundreds of workers during the succeeding eighteen years produced nothing in serious conflict with the conclusion that human and bovine tuberculosis were identical diseases, but they brought to light what appeared to be additional evidence of this identity, such as the discovery that tuberculin produced a specific reaction in tuberculous cattle whether human or bovine bacilli had been

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employed in its preparation. In short, the identity of the bacilli from the two sources appeared to be as firmly established as any other generally accepted opinion regarding the identity or non-identity of bacteria associated with disease in more than one species of animal. Since it thus appeared to be proved that the only difference between human and bovine tubercle bacilli lay in their accidentally different position—one being parasitic in man and the other in cattle—it was natural to conclude that, when circumstances were favourable for the transference of bacilli from one species to the other, human tuberculosis might have an animal origin, and *vice versâ*.

‘Opinions varied as to the frequency with which this transmission of tuberculosis from one species to the other occurred, but practically never within the last eighteen years regarding the possibility and probability of such reciprocal infection. What are the grounds upon which we are asked to discard convictions that appeared to rest on such a solid basis? I shall endeavour to state them briefly, as I understand Dr. Koch’s train of reasoning.

- ‘(1) The bacilli found in cases of bovine tuberculosis are much more virulent for cattle and other domestic quadrupeds than the bacilli found in cases of human tuberculosis.
- ‘(2) This difference is so marked and so constant that it may be relied upon as a means of distinguishing the bacilli of bovine tuberculosis from those of the human disease, even assuming that the former may occasionally be found as a cause of disease in man.
- ‘(3) If bovine bacilli are capable of causing disease in man, there are abundant opportunities for the transference of the bacilli from the one species to the other, and cases of primary intestinal tuberculosis from the consumption of tuberculous milk ought to be of common occurrence. But post-mortem examination of human beings proves that cases of primary intestinal tuberculosis are extremely rare in man, and therefore it must be concluded that the human subject is immune against infection with the bovine bacilli, or it so slightly susceptible that it is not necessary to take any steps to counteract the risk of infection in this way.

‘Now, with the utmost diffidence I venture to submit that at least one of the premises contained in this argument is not well founded, that the others have little or no bearing on the question, and that there still remain reasonable grounds for regarding tuberculous cows’ milk as distinctly dangerous to human beings.

‘It cannot be denied that what may be called bovine tubercle bacilli are as a rule distinctly more virulent for cattle and other domesticated animals than human bacilli, or that the results of experiments indicate that in natural circumstances there is little danger of cattle becoming infected from human beings. But it cannot be admitted that the low virulence of human bacilli for cattle proves, or even makes it **probably**, that bovine bacilli have only a feeble pathogenic power for man. That might have been held to be probable if it had been shown that bovine bacilli were very virulent only for cattle, but since it is well established that these bacilli are highly dangerous for such diverse species as the rabbit, horse, dog, pig and sheep, and, in short, for almost every quadruped on which they have been tried, it appears to be highly probable that they are also dangerous to man. At any rate, it is impossible to cite any ascertained fact relating to other bacterial diseases that makes the contrary conclusion probable. It is well known that the majority of disease-exciting bacteria are harmful to only one or two species, but all those that are common to all the domesticated animals are also pathogenic to man.

‘With regard to the view that the difference between human and bovine bacilli in respect of virulence for cattle is of such a fixed and constant character that it may be relied upon to distinguish the one from the other, it need only be said that that

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is very far from proved. It appears to be quite possible that what may be called the normal or average virulence of bovine bacilli for cattle may be reduced by passage through the human subject. Besides, there are very great differences in the virulence of tubercle bacilli found in animals of the same species, and if a low degree of virulence for cattle is to be taken as the distinguishing feature of human bacilli, there will be no difficulty in proving that the human disease is sometimes transmitted to the lower animals.

'The third proposition in Dr. Koch's argument is the only one which is really germane to the point at issue, viz., that only cases of primary intestinal tuberculosis can possibly have had their origin in infected milk or meat, and that "such cases are extremely rare." Dr. Koch refers to several large series of post-mortem observations that appear to justify this statement, and adds that he could have cited many more pointing to the same conclusion. Now, if it were a fact that all the statistics relating to this point were unanimous, it would have to be admitted that primary intestinal tuberculosis is rare in the human subject, and that cases of infection through milk are still rarer, though even then it might be advisable to take measures to prevent the few cases. But the statistics are not by any means unanimous, and those that are likely to appeal with most force to the people in this country are not at all in accord with those quoted from Germany. During the last few years the evidence obtainable from the post-mortem records of two of the largest hospitals for children in this country have been analysed with great care, in order to see what evidence they afforded as to the relative frequency of the different methods of infection in tuberculosis. In the case of the Hospital for Sick Children in Great Ormond Street this has been done by Dr. George Still, and in the case of the Royal Hospital for Sick Children in Edinburgh by Dr. Shennan. The conclusion at which Dr. Still arrived was that in 29·1 per cent of the cases of tuberculosis in children, primary infection appeared to have taken place through the intestine. That is very far from being an insignificant proportion, and it is a striking fact that Dr. Shennan arrived at an almost identical conclusion, and estimated that 28·1 per cent of the cases of tuberculosis among children in Edinburgh are due to alimentary infection. There does not appear to be any ground for supposing that there is a large margin of error in these statistics, as the number of cases dealt with was considerable (547 in the two series), and in both series the post-mortem appearances were interpreted in a way to which no exception can be taken. In face of these statistics it is not possible to assent to the statement that cases of primary tuberculosis of the alimentary canal are extremely rare. Precisely the contrary conclusion is the one that must in the meanwhile be drawn with regard to the state of affairs in this country, viz., that, at least in children, primary infection by way of the alimentary canal is comparatively common.

'I therefore submit that there is still a strong *prima facie* case against animal tuberculosis as a possible source of human tuberculosis, and it becomes necessary to consider whether there are any data from which one may estimate the extent of the danger to which human beings are exposed through the occurrence of tubercle bacilli in milk.

'The evidence in favour of the view that the ingestion of tuberculous milk is one of the causes of human tuberculosis includes a number of recorded cases in which the relationship of cause and effect appeared to be obvious. From the nature of the circumstances, evidence of this kind is very scanty, and it must be admitted that very few of the alleged examples are absolutely convincing. Tuberculosis is a disease that develops slowly, and, assuming for the moment that tubercle bacilli do occur in milk, and are a cause of disease in persons consuming such milk, it is obvious that, as a rule, the very act by which the infection is brought about destroys the only direct evidence of cause and effect that exists.'

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LEGISLATION SUGGESTED FOR CONTROLLING AND ERADICATING
TUBERCULOSIS IN ANIMALS.

(By PROFESSOR DUNCAN MCEACHRAN, McGill University, Canada.)

Read in Section IV., British Congress on Tuberculosis, London, England, July 26, 1901.

‘The subject for discussion which I have the privilege of introducing to-day is one of very serious import, and one which requires to be very carefully considered in all its various bearings, last by proposing impractical enactments we nullify our good intentions and give rise (as has already been done in some countries and states), to bitter opposition by the owners of infected herds.

‘Our efforts must be to educate the people, so that they themselves will voluntarily adopt our suggestions; and, with the assistance of the state, bring about a gradual diminution in the numbers of tuberculous animals in our herds; and the adoption by every stock-owner in the land of thorough preventive measures by which its re-introduction will be rendered impossible.

‘The first step, therefore, which I would recommend is the publication and distribution among the masses, the agricultural population in particular, of information on the subject of tuberculosis. Much good work has already been done in this direction, but more must be done. If we look back for thirty-five years, when Villimin, Viseur, Chaveau, Gerlach, and others, were engaged in demonstrating the contagious character and transmissibility of this disease, and compare our scanty knowledge then with the vast amount of information which, thanks to Koch, Bang, Nocard and many others, we now possess, it will be easily understood why we, who have been in the field of active work in the practical sense as practitioners and advisers of our governments, have in early days hesitated to advise active control or eradication measures, and why the governments have been slow to pass enactments bearing on the subject.

‘It was in 1882 that Koch first communicated the results of his investigations of the etiology of tuberculosis before the Physiological Society of Berlin, followed by further communications later. The knowledge of its transmissibility being due to a specific bacillus, led to much investigation and experimentation. The reports and contributions to the literature of tuberculosis have for many years filled our journals and book shelves to such an extent that no excuse is left for ignorance concerning the subject on the part of those interested in it.

‘In citing evidence in support of any suggestions one may make as to legislation necessary to enable the people assisted by the government to control and subsequently eradicate tuberculosis from the lower animals, we necessarily must consider the measures tried by those countries, especially in Europe and America which have dealt with it. It is to be hoped that in the course of the discussion some new practical suggestions will be adduced which this congress can recommend for adoption.

‘Until Koch demonstrated that tuberculosis was due to the invasion of an organism, the tubercle bacillus, communicated either directly from an infected person or animal, or by intermediate sources of infection, especially by buildings, pathologists were content to attribute its existence and extension to heredity; when, however, its real nature and its pronounced contagious character came to be known, both medical and veterinary practitioners stood aghast in contemplation of the thousand and one blunders which crowded their memories consequent on want of this knowledge.

‘I remember well when, thirty years ago, I had temerity enough to read a paper based on the continental investigations above referred to, before the Medico-Chirurgical Society of Montreal, in which I ventured to say: “The experiments of continental investigators have clearly established the close relationship between tuberculosis in man and in animals, and the possibility of the disease being in many ways

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transmitted from the one to the other ; and I am well aware that this disease is far more prevalent in the dairy herds supplying milk to the citizens of Montreal than is generally known, therefore, I feel it my duty to invoke the aid of this society in endeavouring to bring about certain sanitary improvements in connection with our meat and milk supply by the establishment of abattoirs under proper inspection; supervision of dairies and inspection of milk." Such was the limited information on these matters at that date that of about forty members present only one was in sympathy with the statements made. He was at the time a young man but recently graduated, who has since made his mark in the world of medical science ; I refer to Professor Wm. Osler of Johns Hopkins Hospital, Baltimore. He alone would admit even the probability of contagion or intercommunicability from animals to mankind, or from mankind to animals, a doctrine which was to sweep away their long-cherished belief in heredity as its sole cause.

‘Pursuing this subject by close observation and numerous investigations of herds in Canada, in which this disease existed, instance after instance came to my knowledge of cases where the infecting animal was clearly traced to a diseased herd.

‘Valuable herds were destroyed by its introduction, and several owners brought to the verge of ruin. At the period to which I refer, shorthorn cattle (Bates and Booth families) had attained fabulous values, £5,000 being a common price for a Duchess heifer, one cow being sold for nearly £9,000 in the State of New York. Many of them were tuberculous.

‘The frequent discovery by clinical examination of tuberculous cattle imported from Britain passing through our quarantines, tuberculosis not being legally classified as a contagious disease at that time, obliged me to urge on the government the necessity for amending the Animal Contagious Diseases Act so as to include tuberculosis in the list of contagious diseases. This was done in 1886, thus enabling us to put a stop to such dangerous animals being admitted to the country to the serious detriment of our home herds.

‘Members of my own and of the medical profession did not hesitate to say that this Act was premature owing to the etiology of the disease being not then sufficiently understood.

‘Were proofs wanting of its contagiousness, I could furnish sufficient to convince the most skeptical but I would be wasting your time by their recital. I must, however, crave your indulgence for a few minutes while I make some general allusions to this characteristic of the disease.

‘The infection of healthy animals we know takes place readily from cohabitation, the bacilli gaining entrance by the respiratory organs in most cases but by the digestive tract in many, especially in calves when suckled by diseased mothers and calves, pigs and other animals fed on milk, or on dairy by-products containing living bacilli ; in pigs when allowed to eat tuberculous matter found in carcasses and slaughter-house refuse given them as food, probably, too, in rare instances, from eating the flesh of tuberculous animals. It is to the buildings themselves, however, we must look for the chief source of infection, and to neglect of disinfection and sanitation must we attribute in a great measure the continuance of the disease and reinfections with which we are familiar. I could cite repeated instances of herds cleared out and new purchases made, with every care in purchasing, being followed by new cases of tuberculosis ; so that I feel that too much trouble cannot be taken by practitioners who are employed to eradicate this disease, to make sure that the buildings are aseptic and that sufficient air space is provided as well as a rational system of ventilation, whereby pure air is admitted and foul air driven out, also that properly trapped drains carry off the liquid excrements and prevent the return of noxious vapours.

‘The importance of pure air and sunshine cannot be overstated in considering the prevention of tuberculosis. It is, however, a mistake to suppose that infection

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will not take place when diseased and healthy cattle are brought together, even when these conditions exist in the very highest degree.

‘I have seen tuberculosis prevalent in ranche cattle, few of which were ever under a roof, ranging on the foothills of the Rocky Mountains in Montana. I have known of a valuable herd of Polled Angus which were brought into the Peace River country in the far North-west of Canada, which proved to be tuberculous and was ultimately exterminated in consequence. In these and other instances which might be referred to, pure air and sunshine certainly prevailed, yet it did not prevent infection taking place when they were congregated in corrals, bunched together during fly time, or in infected sheds in winter.

HEREDITY.

‘To eliminate heredity entirely from the causative factors would be an error, but we are safe in saying that it plays a very unimportant part in its extension. The rarity of the disease being found in calves at birth in all countries has been noticed by Professors Bang, Siedamgrotsky and others, and the immense success attending the rearing of calves from tuberculous cows by Bang’s system in Denmark and other countries, including Canada, prove conclusively that it is not hereditary in the same sense as gout or insanity are known to be transmitted from parent to progeny.

‘When visiting Professor Bang at Copenhagen three years ago he showed me two newly born calves sent in by an inspector ; in the livers of both tubercles were found.

‘Uterine tuberculosis when seen is generally associated with generalized milliary tuberculosis, especially when it is peritoneal.

‘The rarity of tuberculosis in the male genital organs precludes the probability of infection by copulation except in very rare instances ; hence, we infer that when the newly born calf is found tuberculous, infection has probably taken place within a diseased uterus.

‘By far the most numerous infections have occurred after birth. Bang says : “I had occasion to observe more than 400 cases of tuberculosis either in fœtuses or newly born calves ; nevertheless the number of congenital tuberculosis has scarcely gone beyond 0·33 per cent of the killed calves, even in the most infected region.”

‘While intra-uterine infection from a diseased mother is occasionally seen, congenital tuberculosis plays a very unimportant part in the continuance and extension of the disease, compared with the many ways in which the essential factor in its production, viz., the tubercle bacillus, gains an entrance to the animal body, in other words, tuberculosis is a contagious disease, not an hereditary one as was supposed.

THE DIAGNOSIS OF TUBERCULOSIS.

‘The clinical diagnosis of tuberculosis even by the most expert clinical examiner, except in advanced cases, is always unreliable, as tubercle may exist in such a stage as to be impossible of diagnosis by this means.

THE TUBERCULIN TEST.

‘The discovery by Koch in 1890 of the production of fever, indicated by a rise in temperature in tuberculous animals into which he injected a sterilized glycerine extract of pure cultures of tubercle bacilli, while it produced no effect whatever when the animals were free from that disease, furnished us with a simple but very reliable diagnostic agent.

‘The effects produced by this discovery on the commercial aspect of the business of the dairyman and cattle-breeder has been in many instances most disastrous.

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Herds which were supposed to be free from disease were discovered by this test to be tuberculous, dairy businesses have been ruined, justly so we must admit, for no man has a right to sell milk or dairy products manufactured from it when derived from diseased cows, any more than a breeder of purebred stock has to sell animals suffering from a contagious disease from which recovery is the exception.

'The exposure by this means of the prevalence of the disease, especially in dairy cattle, naturally aroused anxiety in the minds of the guardians of the public health, a furor was thus created, and the public mind greatly disturbed when, in addition to this, its intercommunicability to human beings was made known.

'Hence we find many dairymen and cattlemen in all countries denouncing tuberculin and protesting against its use ; not all dairymen, nor all breeders however joined in this denunciation of what is well known to be a safe, harmless, but reliable means of detecting this disease even in its most incipient stages.

'In Canada during the past year from November 1 to November 1 there were 17,785 head of dairy cattle tested officially by voluntary application of the owners, on condition that the entire herd be tested and all reacting animals quarantined for life, without compensation. Of this number only 358 reacted, or about 2 per cent.

'What opposition we met with came from breeders who had suspicious herds, or herds which by private testing were known to be diseased ; it came chiefly from men who combined importing for speculative purposes with breeding.

'In some of these cases the importers, we have reason to believe, were not ignorant of the cattle being tuberculous, in others we fear the man who paid the money was a victim of imposition or gross neglect of his interests on the part of his agent.

'I will cite one instance of each case which came under my personal notice. (a). A herd of thirteen cattle arrived at the Point Lévis quarantine, two of them showing clinical symptoms of the disease. Examination of the chart which accompanied them showed that it was not genuine. It was therefore decided to test them, to which the person who had imported them objected, and while correspondence was going on one cow died from acute generalized tuberculosis ; of the rest all reacted but one and on post-mortem examination all were found tuberculous. (b). A gentleman of large means decided to import a herd of useful but not high-priced shorthorns. He sent an agent to purchase and import them. This agent was instructed to use every precaution by testing and otherwise to secure animals free from tuberculosis. They were bought in Ireland without testing them, they were brought to Scotland, there tested ; two were rejected, the balance shipped to Canada with a chart which was not quite satisfactory, and on retesting them by request of the owner five out of thirteen reacted.

'Personally, I believe with Prof. Nocard that tuberculin does not lie ; how is it then that so many tuberculous cattle come to us in America, accompanied by charts and certificates of health ?

'If the importer is a party to fraud, then he should be severely dealt with, if negligent, then he should pay the penalty of his negligence, for he has no right to import animals suffering from a contagious disease.

'It is possible that agents or middlemen deal in suspected cattle which are bought knowingly by the one class of importer, or foisted on to the other ? Is the professional man employed to test for export imposed on by previous tuberculation nullifying or at least rendering uncertain his honestly applied test ? Are all such men above suspicion (my own experience in a few instances in Canada compels me to say no) or is it the tuberculin that is at fault ?

'When we meet with reactions varying from forty to ninety per cent in cattle certified as healthy, as is found in both Canadian and United States importations, such questions force themselves on us, and are sufficient explanation of why both governments have each decided to keep a professional man in Britain on whose charts alone will cattle be allowed to pass through our quarantines without retesting.

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REACTION.

'We are often asked by importers and testers in Britain what reaction we consider indicates tuberculosis? Experience has taught us that it is not the extent of the rise in temperature so much as its character taken in conjunction with attendant circumstances. Ordinarily a rise of 2 degrees F. above the highest normal is due to tubercle being present; but the single occurrence during the day of such a rise may be due to some accidental circumstance. A typical reaction is arched, the maximum temperature occurring about the seventeenth hour, falling to normal about the twenty-fourth hour or sooner in many cases. The character of the reaction may be altered by copious draughts of cold water, or a lowering of the body temperature from any cause; so also does the raising of the body heat from such causes as flies, atmospheric heat and scarcity of water, all of which produce variations in the reactions. In addition to which might be mentioned applying the test when the animal is excited from any cause such as driving cows in from the field to the stable, railroad journeys, steamboat conveyance, change of climate, change of byre, bulling, stage of the disease (in advanced cases often no reaction follows), and what to us is most important, the uncertainty of reaction for months after injection of tuberculin.

As I said above, tuberculin can be almost absolutely relied upon if properly used, there is no other diagnostic agent to be compared with it, yet it is capable of much abuse, and is often improperly used.

OBJECTIONS URGED AGAINST THE TUBERCULIN TEST.

'In my opinion, there is not one argument used by cattle-owners or importers against its use tenable.

'I have never known a single instance of a person owning a healthy herd lift his voice against it, but I could multiply instances of men becoming almost maniacal in their denunciation of the test since it has been required in the international live stock trade between the United States and Canada as well as in importations from Europe, men whose herds when tested reacted sufficiently to warrant one in suspecting previous knowledge from private testing on their part.

'With a view to get at the truth of some of their objections, I sent circular letters to inspectors throughout Canada, in which I asked replies to the following questions, suggested by newspaper discussions on the subject:—

'1. Do you know of any cases in which the use of tuberculin as a test has produced abortion?

2. Do you know of any instance in which a bull has been rendered impotent by the use of tuberculin?

3. Do you know of any case in which the general health of the animals has been injured by the tuberculin test?

4. How many cattle have you tested during the past year?

5. How many post-mortem examinations have you witnessed of animals condemned in consequence of having reacted to the test?

6. In how many instances did you fail to find tubercle?

'The replies are all negative to the first three questions; to the fourth, they aggregate 22,023 head; to the fifth, 579; and to the sixth, ten and one doubtful.

'Prof. Leonard Pearson, State Veterinarian for Pennsylvania, states in his report for 1899 that "of 4,400 post-mortem examinations made tuberculosis was found in all but eight animals that had reacted."

'I also sent similar questions to a few of the farmers who had most experience with it. The following replies will represent the others:

'In answer to the first question: Do you think that the test injures cattle in any way, he says, "No, I do not think there is the least injury in the tuberculin test."

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Our herd of over fifty head have been tested three years in succession, and I fail to notice any injurious effects whatever from the test."

In answer to question No. 2 : Have you ever had any bad results that you could attribute to the use of tuberculin ? he says, "None. I am using a bull that has been tested five years in succession, and is seven years old, and a more active, healthy animal I never saw, a very sure animal, you may judge, by our dairy of forty-two cows there is only one farrow. As to abortion, we do not have near the trouble that we had before we commenced testing, for I consider that we have a healthy herd now. Previous to the testing of our dairy, we had very serious trouble with abortion."

"1. I do not know of any case wherein the use of tuberculin has produced abortion, and on our farms we have tested cows at all stages, up to within a very short time of calving.

"2. I have never known of a case wherein a bull was rendered impotent or injured in any degree whatever by the use of the tuberculin test.

"3. I have not known of a single case wherein the application of the tuberculin test affected prejudicially in the slightest degree the general health of animals tested therewith.

"4. We have had between three and four hundred cattle tested.

"5. I have not personally witnessed any post-mortem examinations, but I have had reports from the veterinary surgeon who does our work on every animal which was condemned as a result of the test and in almost every one positive traces of the disease were found."

'From these facts we deduce the following :—

'(a) Tuberculosis is essentially a contagious disease, and ought to be classified and acknowledged by every country and state in the world as such.

'(b) It is insidious in its character and in only a few cases comparatively can it be diagnosed by physical examination ; but in tuberculin we have a safe and reliable test by which even latent cases can be diagnosed.

'(c) That tuberculin is harmless ; it does not produce abortion in pregnant cows, impotency in bulls or in any way produce any injurious effect on animals tested by it.

METHODS ADOPTED BY DIFFERENT COUNTRIES.

'Some years ago in Massachusetts compulsory testing was tried but was found to be impracticable, and met with strong opposition.

"Belgium adopted somewhat similar methods with similar results. It had to be given up, and at present the killing is restricted to animals in which the diagnosis can be made by clinical examination.

'In Switzerland free testing is practised, all clinically diseased are slaughtered, reacting animals are marked by cutting out a triangular portion of the ear.

'In France, immediate slaughter of clinically diseased animals, and slaughter within one year of reacting ones.

'In Germany, tuberculin is furnished free, and monetary aid is given to those who adopt the Danish system and otherwise resort to prophylactic measures for its eradication. In most of the German states it is required to sterilize the creamery and dairy products and their by-products, skim and butter-milk.

'In Denmark free testing is done on voluntary application, clinically diseased are killed, the others are divided into healthy and reacting ; these are separated in different buildings or partitions are used to divide the byres ; in one section the healthy, in the other the diseased are placed. The reacting ones are bred from, the calves are reared on milk, from healthy cows or pasteurized milk, or milk which has been heated sufficiently to kill the tubercle bacilli. The success of this plan has been fully demonstrated by Prof. Bang.

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'In America, both in the United States and in Canada, for a number of years all cattle imported from Europe were tested in the quarantines. A few years ago importers urged that the practice too often led them into serious losses, viz., the value of the diseased animals as well as freight and other expenses incurred, and discouraged, as a consequence, importation generally. To meet the views of importers the Canadian Minister of Agriculture ordered that a number of veterinarians throughout Britain be selected, whose charts of tests would be accepted without testing again in Canadian quarantines. This plan worked very badly, as numbers of diseased cattle were imported; several valuable herds being found clinically diseased were slaughtered.

'The United States had similar experiences with British charts of testing. This is regrettable, as both countries acknowledge the great results obtained by British breeders in producing excellent cattle, knowing as they do, that on no other spot on earth can cattle of equal merit be produced. There is something in the soil, and the air of the sea-girt isle so favourable to the production of high class bovines, that breeders abroad must come to Britain for fresh blood to keep up their herds, otherwise marked degeneration is soon apparent. For this reason each country, rather than prohibit importation altogether, has appointed a veterinarian to do the testing, and on their charts alone cattle are admitted to both countries without being tested in quarantine.

'In Canada testing is done at government expense, when voluntary application is made for testing the whole herd, and reacting animals are quarantined for life.

'Bang's system is coming much into practice in Canada. In a few herds it has been successful in a remarkable degree; no compulsory measures have been tried.

'Tuberculosis exists in Canada to a limited extent only. No statistics for the entire Dominion are available, but the following figures indicate this. Testing has so far been confined almost entirely to dairy herds, and was employed in the most of these owing to suspicion or knowledge of infection —

Year	Tested.	Reacted.
1897-98..	6,516	412
1898-99..	16,882	451
1899-1900	17,785	358

THE FOLLOWING REGULATIONS ARE ENFORCED BETWEEN THE UNITED STATES AND CANADA.

Breeding Stock.

Sec. 21. All cattle to be admitted for breeding purposes shall be accompanied by—

(a) A declaration made by the importer that they are actually for breeding and no other purposes.

(b) A certificate signed by a government veterinarian, specially selected and appointed for this duty, that they have been subjected to the tuberculin test and found free from tuberculosis. Such certificates must show the date of testing and chart of reaction, with a description of the animal, giving age and markings. The importer may be required to swear that the certificate refers to the animal represented.

(c) A certificate of inspection signed by a government veterinarian showing that the animals are free from contagious disease, and that no contagious disease of cattle (excepting tuberculosis and actinomycosis) exists in the district whence they came.

(d) When not accompanied by such certificates the animal or animals must be detained in quarantine one week and subjected to the tuberculin test.

(e) Should they be found tuberculous they must be returned to the country from which shipped or slaughtered without compensation.

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Fat Cattle and Cattle for Feeding, Including Range Cattle for Stocking Ranches.

Section 22. This class of animals shall be accompanied by a certificate of inspection, signed by an official veterinarian, showing that the animals are free from contagious disease, and that no contagious disease of cattle (excepting tuberculosis and actinomycosis) exists in the district whence they came.

Settlers' Cattle.

Section 23. Settlers' cattle when accompanied by certificates of health to be admitted without detention, when not so accompanied they must be inspected. Inspectors may subject any cattle showing symptoms of tuberculosis to the tuberculin test before allowing them to enter.

Section 24. Any cattle found tuberculous to be returned to the United States (or killed without indemnity).

'The following extracts from copies of the laws and regulations governing the control and for the eradication of tuberculosis in individual states furnished me by the authorities may be cited with advantage, and can be found more in detail in a bulletin recently issued by Dr. Salmon, Chief of the Bureau of Animal Industry at Washington.

STATE LEGISLATION WITH REFERENCE TO BOVINE TUBERCULOSIS.

Illinois.—Legislation under Board of Live Stock Commissioners. Their rules and regulations are as follows :—

All cases reported to board. When physical condition indicates tuberculosis all exposures are quarantined till tested under direction of the board. Rise of two degrees or more (if in opinion of veterinarian in charge is due to tuberculin) constitutes reaction, and such animals must be isolated and held in quarantine till slaughtered and examined post-mortem. Rise of 1.5 and less than 2 degrees is suspicious, must be isolated and quarantined for retest. Maximum indemnity not to exceed \$75.

Classification for compensation :

Class A.—No lesions. Full appraisal.

" B.—Incipient disease, 75 per cent of appraised value.

" C.—Infected for one year, 50 per cent of appraised value.

" D.—Infected for two years, 35 per cent of appraised value.

" E.—Infected for three years, 25 per cent of appraised value.

" F.—Infected for more than three years, 15 per cent of appraised value.

Should proceeds of carcass exceed percentage valuation, owner receives full amount.

Definite legislation needed with money to carry out provisions. Time not ripe for drastic measures.

Iowa.—No special legislation. Tuberculin used where necessity and public safety demand. Reacting animals tagged and quarantined, provision being made that they may be shipped to any abattoir in the state for slaughter subject to inspection by bureau inspector, state veterinarian or one of his assistants. No remuneration save what animal will bring as fertilizer. Thirty per cent of the reacting animals are condemned on post-mortem.

Work that is done, is done thoroughly, but more is needed.

Kansas.—No specific laws. Must be tested on entering the state. May be brought in for show purposes without test, but if sold must be tested before allowed to stay in state. At the present time there is litigation as to legality of rules and regulations.

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Kentucky.—No special legislation. May be dealt with by State Board of Health. Animal cannot be condemned until examined by competent veterinarian. Indemnity is not provided for.

Maine.—Commission of three persons appointed by governor. Necessary quarantine enforced, half compensation for animals destroyed providing they have been in the state a year or more. Compensation not to exceed \$100 for pedigreed or \$50 for grade stock. Appraisal not being accepted by owner, rigid quarantine enforced.

Tuberculin test not officially designated.

Regulations sufficient, but not enough funds for enforcing properly.

Massachusetts.—General laws on contagious diseases cover tuberculosis. Compensation to full value not to exceed \$40 in any case. Tuberculin restricted to cattle brought in from without the state, excepting upon written request of the owner and on such animals as are condemned as being tuberculous by a competent veterinary surgeon. No compensation granted unless rules regarding disinfection, cleanliness, ventilation, light and water supply are complied with as directed by the commission. Owners using tuberculin are not entitled to indemnity for animals which react, unless the testing is done by its Board of Cattle Commissioners or by its direction.

Regulations work well and good work done, but more money could be spent to advantage.

Michigan.—General law on contagious diseases ; no special on tuberculosis. State veterinarian is acting under general law against tuberculosis. On complaint of local board of health or individuals, suspected cases of tuberculosis are tested. Reacting animals are destroyed or rigidly quarantined. No provision against entrance of tuberculous cattle. Governor has power to prevent but commissioner has not seen fit to protect the state.

Minnesota.—General legislation applies, empowering local or state board of health to act. Two tuberculin tests are required to condemn a tuberculous animal, and must be given within three months and in not less than two months. No further legislation. Experience shows inefficiency of procedure now in vogue.

Montana.—Towns of 5,000 or over to have meat and milk inspector, who must be a graduate of reputable veterinary medical college. All animals supplying milk to the public must have a certificate of tuberculin test, and are inspected every month. Laws just passed, and it is thought that they will prove sufficient if carried out to the letter. Not much tuberculosis in the state, only about 5 per cent.

New Hampshire.—General law relates to tuberculosis. Co-operation is general with federal bureau. Indemnity, full appraised value, to be paid by towns which are reimbursed four-fifths by the state. Such animals must have been owned within the state three months before detection of disease. Cattle entering the state must be tested under authority of board of commissioners. Pasturage permits granted on physical examination by competent veterinarian, a graduate of a recognized school. Massachusetts cattle, tagged by the Massachusetts Cattle Commission, allowed to go to New Hampshire for pasturing and return to Massachusetts without test.

Upon request by cattle-owner, he may have his herd officially inspected by the board. If inspector deems it necessary, tuberculin is used, and owner must conform to measures prescribed by board. Test applied at state's expense and half value for all animals reacting. Precautionary measures to stamp out disease at owner's expense.

Experience shows that enforcement of sanitary measures is as important as the destruction of diseased animals. Ventilation, light, exercise of animals, and disinfection regarded as the most important part of the work. Progress is being made in suppression. Radical measures not needed.

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New Jersey.—Commission of seven, composed of president and secretary of Board of Agriculture, and five others appointed by the president. Examine herds on request, but tuberculin test is optional with the commission. Condemned animals appraised at market value, and three-fourths paid to owner. All cattle from without the state are tested.

Gradually lessening prevalence by educating farmers as to its character and the need of greater care in breeding, stabling, sunlight and ventilation.

State of New York.—Tuberculin applied upon written request under conditions prescribed by Commissioner of Agriculture. Commissioner may order test, holding a reacting animal in strict quarantine. He may condemn, quarantine or slaughter when tuberculosis is found on physical examination. Compensation shall not exceed \$60 for thoroughbred and \$40 for grade, providing animal is not found to be diseased at the post-mortem. If the animal is diseased with disease for which it was killed or other dangerously contagious or infection disease, no compensation is allowed.

Animals entering the state passing the federal authorities are allowed to proceed.

North Dakota.—Tuberculosis under general legislation. State and district veterinarians can deal with subject. Cattle from without the state must have certificate of health or be examined by state official. Tuberculin test not specified.

Pennsylvania.—All animals entering the state must be tested with tuberculin. Other testing left to discretion of board. Compensation not more than \$25 for infected grade and \$50 for infected registered stock. Measures for combating this disease, as well as others, at discretion of board, and are not inflexible.

Rhode Island.—Appraisal for 'scrub' animal \$50, grade \$75, and registered \$100. In event of animal being found infected at autopsy, state pays half value, but if healthy, full value. Animals must be owned within the state at least three months previous. Cattle coming into the state must be tested with tuberculin.

Utah.—Cattle having tuberculosis shall not be kept by dairymen, and shall be killed by the dairy and food commissioners. There is no provision for the tuberculin test or for indemnity.

Vermont.—Tuberculin test without expense on application, and whole herd must be tested. Such herds cannot admit new animals unless they undergo the test. Reacting animals must be killed and buried or burned at the expense of the owners. Owners retain the hides. Board regulates right to retest when considered necessary. Rules of board where herds are tested regarding disinfection must be observed. Cattle entering the state from without must be tested by person approved by board and expense borne by owner. Animals killed by written order of the board, appraised, such appraisal not to exceed \$40. Post-mortem held, and if tuberculosis or other disease dangerous to public health is found, owner receives half appraised value. Such animal shall have been in the state six months previous to discovery of disease.

Experience shows that if rules are followed for disinfection, disease is stamped out. Persuasion used by board to induce testing of suspected herd. Measures radical enough at present, for the public must be considered and be in sympathy with the movement rather than antagonistic.

Virginia.—Tuberculosis is classed as a highly contagious and infectious disease. Board of Control of Agricultural College has power to enforce such measures for its control as are deemed necessary.

Educate the people by furnishing them with the most important scientific and practical facts known about the disease. Much good has been done in Canada by the distribution broad-cast of bulletins among the agricultural population on this and kindred subjects.

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INSURANCE.

‘At the VIIth International Veterinary Congress, held at Baden Baden two years ago, Professor Siedamgrotzky suggested a system of insurance which, if it could be carried out, would be a common sense way of lessening individual losses consequent on eradication by slaughter of clinically diseased and reacting animals.

‘This is, however, surrounded by many practical difficulties, yet it is well worthy of the consideration of this congress.

‘An effort should be made to provide an indemnity fund by this or some other way, the public purse contributing a liberal share, otherwise I fear the progress made in eradication will be slow.

‘In the state of Illinois, United States of America, indemnity is paid by the state, on a plan which is worthy of imitation.

‘A maximum value is fixed at, say, £15. Diseased cattle are classified as follows after being slaughtered :—

Class A in which no lesions are found	Full appraised value.
“ B in incipient stage	75 p.c. appraised value.
“ C infected for one year	50 “ “
“ D infected for two years	35 “ “
“ E infected for three years	25 “ “
“ F infected for over three years	15 “ “

‘Should the proceeds of the sale of the carcass exceed the percentage valuation, the owner is paid the full amount so received.

SUGGESTED LEGISLATION.

‘No legislation will accomplish the end in view unless the measures are such that the public are in sympathy with them rather than antagonistic to them.

‘I. Tuberculosis should be included in the list of contagious diseases. Tuberculous animals should consequently come under the provisions of the Animal Contagious Disease Act, but the local authorities should have power to allow the sale and movement of such parts of the carcasses as are known not to carry contagion, such as hides, hoofs, horns and hair, thus preventing unnecessary loss.

‘II. All foreign animals admitted for breeding or dairy purposes should be tested by the tuberculin test. Tuberculous animals should be prohibited from entering.

‘III. Tuberculin should be controlled, and none but qualified veterinarians be allowed to use it ; and all reacting animals should be reported, marked and quarantined.

‘IV. All animals showing clinical symptoms of tuberculosis, especially disease of the udder, lungs, uterus or bowels should be killed at once ; and all scrub and grade animals reacting should be killed within six months. Pure bred cattle may be bred from under Bang’s system in quarantine for life.

‘V. All testing other than of imported animals should be by voluntary application for a test of the entire herd, and the expense should be borne by the state; a reaction of 2 degrees to be understood to indicate tuberculosis, 1½ degrees as suspicious. Suspicious animals to be quarantined and retested in three months, unless clinical symptoms develop, when they would be at once condemned. The government to have the right to order retest when considered necessary.

‘VI. Disinfection of premises should be ordered by special regulations, the carrying out of which will be superintended by government officials.

CIRCULAR *re* TUBERCULIN TESTING.

'The following circular is about to be printed and distributed throughout Canada for the information of the public.

TESTING CATTLE FOR TUBERCULOSIS BY GOVERNMENT VETERINARIANS.

In consequence of dissatisfaction having been expressed by the Bureau of Animal Industry of the United States Government at Washington with the results of testing of animals purchased in Canada for importation into the United States, an agreement was entered into in February, 1901, between Secretary Wilson, of the United States Department of Agriculture, and the Honourable Sydney Fisher, Minister of Agriculture for Canada, whereby all testing of cattle intended for the United States must be done by permanent official veterinarians duly appointed and paid by the government. This necessitated the cancellation of a large number of nominations of veterinarians throughout the Dominion for the purpose of testing, as well as increasing the number of permanent officials, who alone are authorized to test for export to the United States. A list of these in each province is herewith appended.

TIME AT WHICH TESTING IS TO BE DONE.

Cattle for export will be tested at any time due notice is given to the Department of Agriculture at Ottawa, so that the first available officer may be sent to make the test.

TESTING OF CATTLE NOT FOR EXPORT.

Practical experience has demonstrated that for many reasons it is undesirable to test dairy stock from March to October. Many cannot be tested, owing to being advanced in pregnancy ; the disturbance of the cattle in removing them from the fields into byres, change of food, heat, flies, all interfere with the reliability of the test ; besides, much valuable time is lost by owners and inspectors, when the work is done during the busy season. Therefore, no testing will be done of dairy stock or of any stock not for export, except from October 1 to March 1, or at the period of the year in which the cattle are regularly housed. Applications should not be sent to inspectors direct. When so sent, delays and disappointments occur, whereas, when sent to the department, a proper disposition is made. Should it be found that more applications are sent than can be complied with by the permanent staff, a sufficient number of qualified local veterinarians to test animals not intended for exportation to the United States will be temporarily employed.

TESTING IN GREAT BRITAIN FOR IMPORTATION TO CANADA.

It was considered necessary for the protection of Canadian cattle to take special measures to prevent tuberculous animals being imported, and for this purpose an official veterinarian was appointed and located in Glasgow. The United States government took similar action, their inspector being located at London, and, for mutual convenience, it was agreed that each country would accept the certificates of either inspector, and cattle arriving accompanied by a certificate of test signed by either of the inspectors need not be retested before leaving quarantine. When not accompanied by these certificates, they will be tested by the quarantine superintendent before being allowed to leave the quarantine.

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LIST OF OFFICIAL VETERINARIANS AUTHORIZED TO TEST FOR
EXPORTATION TO THE UNITED STATES.*Prince Edward Island—*

W. H. Pethick, V.S., Central Bedeque.

Nova Scotia—

William Jakeman, D.V.S., Halifax.

New Brunswick—

J. H. Frink, V.S., St. John.

Quebec—

J. A. Couture, D.V.S., Quebec.

V. T. Daubigny, D.V.S., Montreal.

A. E. Moore, D.V.S., Montreal.

C. H. Higgins, D.V.S., Montreal.

Ontario—

Wm. Stubbs, V.S., Toronto.

J. H. Tennent, V.S., London.

Geo. H. Higginson, V.S., Rockland.

Manitoba—

Chas. H. Little, V.S., Winnipeg.

North-west Territories—

J. C. Hargrave, D.V.S., Medicine Hat.

British Columbia—

J. B. Hart, D.V.S., Vancouver.

OFFICIAL VETERINARIANS FOR TESTING IN GREAT BRITAIN.

J. G. Rutherford, V.S., care of Canadian Government Agency, Glasgow, Scotland.

Tooie A. Geddes, V.S., care of U. S. Consul General's Office, London, England.

List of United States Official Veterinarians furnished by Dr. Salmon, November 27, 1901, as 'A correct list of inspectors to whom are referred practically all of the inspections and tests of cattle for export to Canada.'

Bennett, D. S. E., 44 Kilby Street, Boston, Mass.

Corlis, Dr. W. S., Watertown, N.Y.

Cowie, Dr. Chas., Ogdensburg, N.Y.

Cumming, Dr. David, 719 Park Street, Port Huron, Mich.

Dealman, Dr. J. F., Sault Ste. Marie, Mich.

Huntington, Dr. F. W., 37 Union Street, Portland, Me.

Green, Dr. L. K., Detroit, Mich.

Ketchum, Dr. F. D., South, St. Paul, Minn.

Knowles, Dr. M. E., Helena, Montana.

Mayne, Dr. H. D., Malone, N.Y.

Morin, Dr. C. L., St. Albans, Vt.

Potter, Dr. H. T., Calais, Me.

Russell, Dr. F. L., Orono, Me.

Volgenau, Dr. E. L., Live Stock Exchange Building, East Buffalo, N.Y.

Ward, Dr. G. W., Newport, Vt.

Zink, Dr. C. H., Live Stock Exchange Building, East Buffalo, N.Y.

A. L. JARVIS,

Acting Deputy Minister of Agriculture.

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I take the liberty of reproducing here the following extract from the *Farming World* of September 4, 1900, on Canadian cattle quarantines :—

THE CATTLE QUARANTINE SYSTEM OF CANADA.

‘Every agriculturist in Canada has an interest in the health of animals, but fortunately for him it has so far been a passive one. Unlike his brother farmers in European countries, he has enjoyed almost complete immunity from the ruinous effects of contagious diseases in animals; probably most of us have not asked why. We purpose in a short article written up from authentic records which we have been able to consult, to inform the younger portion of our readers how the cattle quarantine originated.

‘The first record of any suggestion of cattle quarantine is found in a letter addressed to the Minister of Agriculture, dated Montreal, September 28, 1875, signed Duncan McEachran, which we here reproduce :

MONTREAL, September 28, 1875.

‘SIR,—The consideration of contagious diseases and infectious diseases with a view to prevent their introduction into this country is a subject to which my attention has long been directed. Having had considerable experiences of them in Britain before coming to this country and during my recent visit to Europe I visited several farms to familiarize myself with foot and mouth disease, and from numerous conferences with professional men on the subject, I gathered what practical information I could relative to them and the best means of dealing with them. By the careful study of the works of Fleming, Gamgee and others, I hope I have prepared myself to be of some service to the department in taking the proper measures in endeavouring to preserve our valuable herds of farm stock free from contagious diseases of a preventable character.

‘It is a well-established fact that “cattle plague,” “pleuro-pneumonia,” “foot and mouth disease,” “small-pox in sheep,” were all introduced into Great Britain by stock imported from infected districts on the continent of Europe, that they spread entirely in the lines of commercial communication, and that they are propagated by contagion and contagion alone.

‘For want of proper preventive measures, these diseases have from time to time been introduced and spread over the British Isles, bringing death, or almost equally ruinous deterioration in value of the entire stock, as for the time being to paralyze the agricultural industries of the country, and create dearth and destitution among the labouring classes. The annual loss to the mother country is counted by millions of pounds sterling.

‘Our country is essentially agricultural; the stock interests represent a very large proportion of our wealth. So far, we have enjoyed almost perfect immunity from such diseases. This fact alone has directed the attention of other countries to Canada as a rich source of meat supply, and the industry properly preserved and judiciously encouraged, will doubtless soon become a rich source of revenue.

‘That active steps are necessary need not be doubted. When we know for a fact that in England, owing to the unusual prevalence of such diseases, it is almost impossible for animals to be shipped from an uninfected district, and that it is quite possible for an animal on being shipped, presenting no symptoms by which the disease could be recognized, the stage of incubation (period elapsing from introduction of disease germ till development of symptoms) in foot and mouth varies from twenty-four hours to twelve days; cattle plague, usually about five or six days, but by many is said to extend to sixteen or eighteen days; pleuro-pneumonia, from thirty days to ten or sixteen weeks, and, further, that it is a fact that hay, straw, blankets, halters,

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clothing of attendants, &c., may be the medium of conveying and propagating the contagion, the presence of which in these articles no inspection or examination can determine till the effects declare the fact. That the effect of a visitation of the least virulent of the above diseases to a herd, by death, loss of flesh and injury to the constitution, cessation of the secretion of milk, abortion, want of conception, &c., reduces its value to one-third or one-fourth. That these diseases, with proper precautions, are preventible, I have every reason to believe. The length of time elapsing from the time of shipment to their landing in the country, with the tendency for sea-sickness to lessen the incubative period, are all favourable to an early development of the symptoms after landing, and, thereby, enable us to shorten the duration of quarantine. Our cold, clear climate during winter, and our dry atmosphere during summer, in my opinion, would make such diseases more controllable than in the humid, heavy atmosphere of Britain. But, on the other hand, we know from experience of epizootics among horses, once the disease is propagated, these very circumstances favour the spreading in a most extraordinary degree.

‘I have taken the views of our most extensive importers, and find that a system of quarantine would meet the approval of all of them.

‘Should the department desire it, I will be happy to lay before them, either by letter or interview, some suggestions as to how this could be carried out without disturbing the cattle trade of the country, but on the other hand, securing it by preserving a clean bill of health to our valuable herds, believing, as I do, with Professor Gamgee : “That it is of the highest importance to protect the property of our people, to prevent an improvident waste of life and money and submit a choice of evils to some interference with the freedom of the subject whenever the doings of one man or a few are likely to injure the million,” an interference which would be approved of most by those whom it would most affect. Doubtless, the carrying out of a thorough system of inspection, quarantine and disinfection would occupy time and cost money, but the advantages to the country would be very great.

‘The above is most respectfully submitted by

Your obedient servant,

(Signed) D. McEACHRAN.

The Hon. The Minister of Agriculture,
Ottawa, Ont.

‘Fortunately, this letter was backed up by the leading cattle-breeders and importers of that date, particularly the late Hon. George Brown and the late David Christie, Senator Cochrane and others, and resulted in the acceptance of the proffered service and the taking of the initial steps, at first permissive detention with the consent of the owner, followed shortly after by the utilization of Fort No. 3, at Point Lévis, and the erection within its yards of suitable sheds for receiving and keeping cattle, sheep and swine, first for eight days, but shortly after, ninety days for cattle, on account of the prevalence of pleuro-pneumonia in Britain, the period of incubation for which being usually three months’ duration.

‘The utility of a quarantine system being demonstrated, stations were subsequently established at Halifax, N.S. ; St. John, N.B. ; Charlottetown, P.E.I. ; Sarnia, Ont. ; Emerson, Man. ; Estevan, Assiniboia ; St. Mary’s, south of Macleod, Alberta ; Huntingdon and Victoria, B.C. ; besides numerous inspecting stations at which no regular stations have yet been established—all of which have been extremely valuable in preventing the introduction of diseases of animals.

‘The extension of this exportation of live stock necessitated the supervision of the steamships as to space and ventilation and the inspection of the stock before being shipped. For this purpose special inspectors were appointed at the shipping ports.

‘It was found necessary to investigate all reports of disease within the country and to deal with them with a view to eradication and prevention. Such diseases as sheep scab, parasitic mange in cattle and, particularly, tuberculosis.

‘Hog cholera and swine plague have been actively dealt with from time to time. This necessitated the appointment of no less than twenty-six permanent inspectors and 209 appointed, but only employed as required. Pathologist and assistant pathologist—an experiment station and bacteriological department all contributed to the efficiency of the Cattle Quarantine System of the Dominion.

‘It now forms a most important branch of the Department of Agriculture, the value of which to the stock-breeders more directly, but no less to the cattle shippers, railroads, steamships, bankers and merchants generally, would be difficult to estimate, as is always the case in dealing with prevention of loss ; the following figures from the statistical year-book, 1897, however, may furnish food for thought :

“In Canada 45 percent of the population is engaged in rural pursuits. The railroads depend on agriculture for one-fourth of the freight they carry and the canals one-third. Canada’s merchant marine depends chiefly upon the produces of the farms and ranges, and more than one-half of the total exports are agricultural products.

Exports for the year 1897.

	Value.
Horses..	\$ 1,710,922
Cattle....	7,159,365
Sheep.....	1,002,011
Swine...	4,053
Other animals and poultry..	111,349
	<hr/>
	\$ 9,937,723
Agriculture products..	45,545,869
	<hr/>
Total..	\$55,533,592

“There being no census of animals for the Dominion taken since 1891, we were obliged to make use of the figures obtained that year to illustrate the magnitude of our animal population :

	Number.
Horses..	1,470,872
Cattle...	4,120,586
Sheep.....	2,363,761
Swine...	1,733,630

“To these probably 10 per cent may be added to represent the figures of this date.

“If our live stock and their products assume such large proportions, and their exportations form such an important item of our foreign trade now, what may they not reach in the future? When, by the rising tide of immigration, our great fertile regions now unpeopled are brought under cultivation and made to yield of their abundance, it will swell the volume of exports several hundred per cent more than they are to-day, both in animal and agricultural products. We can by very little thinking foresee the vast interests at stake in this country, which is destined to become the foremost food-producing country on the globe.”

‘The following statistics from Fleming’s Veterinary Sanitary Science and Police will serve to illustrate what has happened where preventive measures were neglected :

‘Cattle Plague.—Great Britain, 105,566, 279,023 reported sick, 233,622 died or were killed, 40,165 recovered.

“Contagious Pleuro-Pneumonia.—In Great Britain, from 1834 to 1880, it is estimated that there perished considerably more than 1,000,000, head valued at \$60,000,000.

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“In Australia.—The losses during thirteen years were about 30 to 40 per cent of the whole number of cattle, or about 1,404,097, valued at \$42,500,000.

“Foot and Mouth Disease.—Although it is not a very fatal disease, it is very contagious, and usually affects nine-tenths of the animals in the district and entails great losses from loss of flesh, loss of milk, resulting sterility, embarrassment of traffic, cost of nursing, cost of inspection and other heavy expenses.

“It is estimated that in Great Britain during 1872 the money loss amounted to at least \$65,000,000.

“Tuberculosis.—In my opinion, this is the greatest scourge of the farm—sparing scarcely any species of our domestic animals, affecting more especially cattle, pigs and poultry—intercommunicable from animals to man and from man to animals. Insidious to a degree, incurable as a rule, invading our homes in the milk supplied for nourishment, the virulent bacilli working their deadly effects on our little ones, our invalid friends, or it may be, our own bodies, well may we exclaim, “In the midst of life we are in death.” No reliable statistics of the extent to which this fell destroyer exists in the herds of this country have been taken, no general testing of the cattle has been attempted, but of some 10,000 head tested the percentage is small compared with older countries and more populous centres, yet sufficiently large to render the responsibility of the government onerous indeed. Fortunate it is that this disease, while communicated from cattle to the human subject readily when the milk drawn from diseased udders is ingested without sterilization, it is not readily communicated in any other way to any except to those who are in constant attendance on cattle suffering from tuberculosis of the throat or lungs, who are thus exposed to inhalation infection.

“Apart, however, altogether from human infection, this disease is one which causes enormous losses in nearly every dairy country in the world, or wherever cattle are housed, and fresh cattle frequently brought into the herd, as is the case in most dairy herds. To these bovine scourges must be added contagious diseases of other species of domestic animals.

“Glanders in horses, if left unchecked, would decimate our horses, and cause, as it does in the old countries of Europe, serious losses.

“Hog cholera is a most virulently contagious and fatal disease. \$20,000,000 a year is estimated to be lost in the United States from its ravages.

“Scab in sheep, where sanitary measures are not understood, causes immense losses from loss of wool, from death and expenses in dipping and caring for the diseased flocks.”

“What does it avail if the breeder spends valuable time and money in improving his flocks and herds if he is not protected by wise preventative measures from such diseases as would frustrate and nullify all his efforts? What though professors of dairying teach and farmers adopt the most complete systems of butter and cheese production, if the milk-supplying herds are suffered to sicken and die from preventable diseases ?”

POINT LEVIS CATTLE QUARANTINE.

This quarantine station, which was first opened for the reception of imported cattle in 1876, and was for some years confined to a few sheds, hurriedly constructed on a cheap and temporary basis within the yard of Fort No. 3, had to be rapidly extended to meet the requirements of the large importations of breeding stock which took place during the early eighties, until the government land surrounding the Fort was covered extensively with sheds and yards.

The prevalence of contagious pleuro-pneumonia in Great Britain, and its unfortunate importation to the quarantine in 1886 as well as repeated importations of foot and mouth disease, illustrated in a forcible manner both the necessity for a quarantine

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station and its efficiency to deal successfully with contagious diseases when they were found among imported stock. Twice foot and mouth disease and once, contagious pleuro-pneumonia were imported ; each time the disease was prevented from spreading beyond the herds which brought it or those which had contracted the disease by contact on board ship.

As a result of these unfortunate occurrences, more stringent quarantine measures had to be enforced which had the effect of lessening the numbers of imported animals and for a number of years very few were imported either by Canadian or United States cattlemen. During this period of several years the buildings, from disuse, got considerably out of repair ; several which had been burned in stamping out contagious pleuro-pneumonia were not rebuilt, and others were pulled down, partial repairs being made to the best of the sheds and fences. The revival of high-class cattle breeding, in the United States and Canada which has taken place to a large extent within the past few years, the eradication of C. P. P. from the American herds, and its almost complete extirpation from the herds of Great Britain, has given an impetus to importation and necessitated the rebuilding of most of the fences and several of the buildings, and the erection of several new ones. This work was done by the Public Works Department, and the opportunity presented was taken advantage of to rearrange the yards and buildings for convenience and isolation. I have much pleasure in reporting that the work so far as completed has been done in a satisfactory manner, and also in appending a diagram of the quarantine prepared and kindly reduced by a draughtsman of the Public Works Department, a study of which will show that ample provision is made for perfect isolation by avenues and roads from 50 to 60 feet wide separating the various yards. The whole of the grounds being inclosed by a close boarded fence 6 feet high, with an interval of 60 feet between it and the yard fence, wherever it is necessary the yard fence is also close boarded and 6 feet high. Excellent accommodation is provided for quarantining 464 cattle and 300 sheep ; this, if necessary, could be extended. It is needless to say that the buildings although not expensive in character are admirably adapted for their purpose, and are roomy, thoroughly lighted, and ventilated. They are kept scrupulously clean, being disinfected and white-washed on the removal of cattle or sheep at the expiry of their quarantine period.

This quarantine continues to be largely patronized by United States importers who are attracted to the St. Lawrence route, which is a favourite one with them largely owing to the excellent accommodation afforded at this quarantine.

In addition to the quarantine proper, there is a shed near the wharf where the cattle are taken to, temporarily, when landed from the steamships. It accommodates 50 cattle. To this shed are taken any animals showing signs of illness of any kind on arrival, whence they are taken later to the quarantine, provided they do not show any signs of a contagious disease. This shed is most useful, however, for receiving stock from late or early arriving ships. The road from the landing shed, or steamer, is a semi-private one, little used on account of its steepness—very rarely do any domestic cattle pass over it. Under the precautions taken no domestic animals can come into contact with either incoming or outgoing stock. Twenty-five years' experience has demonstrated that it is perfectly safe for the movement of cattle to and from the quarantine.

I have pleasure in reporting that so far as its capacity goes, the suitability of arrangement, and isolated position and the high, dry, healthy location, leaves little to be desired, and this is the opinion of nearly all the importers and a large number of representative men, veterinarians and others, who have visited it officially to report on its arrangements, both to the United States government, State Cattle Commissioners and representatives of cattle-breeders, and others in Great Britain and elsewhere.

To complete the repairs it will be necessary to replace some more of the old fencing by new, improve the roads, improve the arrangements for distribution of water, and put down a few sidewalks, all of which I hope will be done during the coming year.

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A NEW DISEASE IN HORSES—ENZOOTIC FISTULOUS WITHERS AND POLL-EVIL. ¹

The following reports have been forwarded from British Columbia of a disease which is new to the veterinary profession, an enzootic form of abscess and fistulae in the withers and polls of horses, and which is also stated to have been seen in cattle.

Similar reports have reached the Bureau of Animal Industry at Washington, D.C., from veterinary practitioners at Perry, Iowa, and Albany, Georgia.

This disease is common enough, but is known only as the result of bruising of the withers by badly fitting saddles, and injuries of the poll leading to the formation of abscesses and fistulae. So far, no investigation has been made in the United States or Canada which has explained this peculiar occurrence.

(Extract from Dr. J. B. Hart's letter.)

‘VANCOUVER, August 27, 1901.

‘Dr. Gibbins, the Provincial Inspector, has interviewed me several times *re* a disease which the Hon. Mr. Prentree and others claim to be contagious or at least infectious. This disease (or reports of same) seems to be confined to the upper Fraser valleys, Chilcoten, Nicola and Douglas lake districts. It makes its appearance in all kinds of horses and has been seen in a few cattle. As nearly as I can judge from the reports it has every appearance of fistulous withers. The first symptom is a swelling over or on one side of the dorsal vertebrae, and in some cases lower than the cartilaginous prolongation of the scapula, may involve one or both sides, and is accompanied by the usual heat and swelling with intense pain. The swelling bursts and suppurates, usually the discharge is from the top. The pus burrows deeper and deeper and the characteristic sinuses of fistulae form.

‘Animals rarely recover as they are far removed from medical assistance and are usually vicious.

‘The Doctor has been up on two occasions and previous to his last visit I requested him to secure for me some pus from an authentic case. This, however, he failed to do, but says he expects to receive some very soon. I intended to send it to you and have it examined microscopically. The points that appeal to me most strongly are 1st. The recurrence of this trouble yearly in spring and fall; 2nd. All kinds of horses, two years old running out, pack-horses, saddle horses, harness and draught horses, brood mares that have not been bridled for years, &c., being affected. 3rd. The confident stand the owners take as to its infectious nature against Dr. Gibbons's stated opinion as to its purely traumatic causes and non-infectious nature.

‘I asked the doctor to write and send you copies of the correspondence with the owners.’

(Report by Provincial Veterinarian Johnson Gibbins, M.R.C.V.S.)

‘VANCOUVER, September 30, 1901.

‘SIR,—I wish to draw your attention to a disease among horses in the Chilcoten and Cariboo country, as you will see per inclosed which I send for your guidance, and to see if you can come to any other conclusion than one of fistulous withers.

‘I was up there in July to make an investigation, but I could come to no other conclusion than fistula.

‘Truly it seems very strange that so many horses should be affected in this district, both old and young, mild and domesticated, many that have never been broken; it seems almost unaccountable. As you see by inclosed it has even been observed in cows. I did not see this myself, neither did I discover anything in the shape of eggs as this same individual describes. I tried my best to get some pus when up there, but

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in this I was frustrated, there being no cases just at that time in which I could get any pus, however, I left small bottles in which those interested promised to forward me some sealed up, but as yet I have not received any ; hence my delay in not writing you together with your being away at that time.

'There are also a few cases in which the polls are affected in the same way, resembling poll-evil.

'Now, in many cases different individuals are satisfied that the trouble is of a traumatic character, then again others will have no alternative than its being infectious and contagious as they say most emphatically that the malady is not from any injury whatever.

'I may say that I have interviewed all the professionals on the coast and they one and all seem puzzled, but can come to no other conclusion than "fistula."

'I shall be pleased to hear your opinion, and if there is anything further you desire to know in this connection, I shall be most pleased to give it.'

(Signed) JOHNSON GIBBINS.

I have the honour to be, sir,

Your obedient servant,

The Honourable

The Minister of Agriculture,
Ottawa.

D. McEACHRAN,

Chief Inspector.

No. 15.

REPORT UPON BOVINE TUBERCULOSIS AND OTHER MATTERS.

(J. GEORGE ADAMI, M.A., M.D., F.R.S.E., Professor of Pathology, McGill University,
Pathologist to the Department.)

J. H. R. Molson, Pathological Laboratory, McGill University,

MONTREAL, October 31, 1901.

SIR,—I have the honour to forward to you the report of Dr. Higgins, Assistant Pathologist to your department, upon the work accomplished in connection with his duties and more especially upon the observations on tuberculosis carried out by him under my supervision at Outremont and in my laboratory.

That work has been seriously interrupted by his temporary appointment last year as bacteriologist in charge of the Plague Laboratory at William Head, Victoria, B.C., under the quarantine branch of your department. I had the opportunity to inspect the work carried on by him there and can only speak in terms of high praise for what he managed to accomplish under great difficulties. Most unfortunately this appointment was for an indefinite period, a period which lasted over the greater part of the year, delaying our researches at Outremont and arresting them at a time when, after long preparation, they promised to lead to valuable results, results which now have been forestalled by other workers in Europe and in the United States. Called away at a few hours' notice, Dr. Higgins had no time to go with me to Outremont to show me exactly what he wished doing with the various animals, nor to leave instructions as to the course to be pursued with the cultures and other material which he was working on in the laboratory. Nor, possibly, had he been able to do this, could I have continued his work in a satisfactory manner, for it is a peculiarly difficult matter for one observer in pathology to take up and carry on the individual pieces of work in progress by another observer. Thus, expecting that he would return within the course of a few weeks, during which time little harm would ensue by his absence, neither he

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nor I were willing that I or any other should continue his observations, and the waiting to know what had been determined concerning his future continued for so long a period that unavoidably the cultures and many of the series of observations upon animals were rendered valueless, nor has it been possible since to start them anew.

By referring to our previous reports it will be seen that our work at Outremont had led us specially to consider the modes of infection by tuberculosis among cattle and the relationship between the human and bovine tuberculosis. That bovine tuberculosis can be transmitted with fair ease from cow to cow there is now no doubt. Dr. Higgins has shown how the bacilli of tuberculosis can be demonstrated in the matter coughed up or violently expelled from the mouths and nostrils of infected cattle by placing sheets of glass over the fronts of the stalls of animals showing symptoms of pulmonary tuberculosis. Upon these sheets the fine particles of sputum expelled on coughing, lodged and became fixed so that the contained tubercle bacilli could later be stained and recognized under the microscope.* (Vide Report of the Minister of Agriculture for 1899, pp. 144-147.)

In Dr. Higgins's present report he records some interesting observations upon the effects of cohabitation, namely, of placing healthy calves in the same stall with infected animals. The interest in this series of observations lies especially in the fact that the infected animals showed very little clinical evidence of tuberculosis; they reacted, it is true, to tuberculin, but for some months one of them failed to give the tuberculin test. Notwithstanding this there was evidently at certain periods active progression of the disease in the lungs and the cohabiting calves became infected. (Vide p. 141.)

The earlier observations by Drs. Martin, Higgins and myself had further confirmed those of workers in other countries upon the infectiousness of the milk of tuberculous cattle for calves and animals of the laboratory and had convinced us that, contrary to the views of most English observers, though confirmatory of the work of earlier German observers (whose methods, however, are not regarded as having been wholly satisfactory) and of the more recent work of Ernst, of the United States, tubercle bacilli capable of infecting guinea pigs and rabbits may be present in the milk of cattle not suffering from udder tuberculosis. These observations have since been fully confirmed by Kempner and Rabinowitsch, who employed methods similar to ours.

Taking all the facts at our disposal into consideration, we could not believe that milk containing a minute number of tubercle bacilli could be dangerous for man, and this led us to lay down that Nocard's view must be taken as correct, namely, that only when there is definite tuberculosis of the udder is milk to be regarded as dangerous and liable to convey infection to man, and to urge that every animal showing such tuberculosis must be immediately and absolutely condemned. It was these results and considerations which led us inevitably to study the relationship between human and bovine tuberculosis.

In my last report (Report of Minister of Agriculture for 1889, p. 139) I detailed the main facts at our disposal, pointing to the conclusion that the bacilli causing tuberculosis in fowls, man and cattle, vary one from the other, so that it is possible to distinguish them by the features presented by one and the other when cultivated outside the body, as again by their effects when inoculated. I pointed out that they must not be regarded as distinct species; that, for example, tubercle bacilli of man if placed under certain conditions in the bodies of fowls, after the course of months gradually as they grow assume altered characters, so that now they become virulent

* This had been previously demonstrated in connection with phthisis and the spread of human tuberculosis by Flügge, of Breslau, who employed similar means, but not until these observations has it been demonstrated for infection for animals. Since the publication of our report, Dr. Ravenel, of Philadelphia, has demonstrated the same fact by a modification of the method employed by Dr. Higgins.

for fowls (which before they had not been) and undistinguishable from the bacilli of avian tuberculosis (Nocard). I also reported that we were executing observations along the lines to demonstrate if possible that human tubercle bacilli retained in the bodies of cattle, gradually took on the characters and the peculiar virulence or infectiousness of the bovine bacilli. It is this particular series of observations that has been interrupted by Dr. Higgins's absence, and this most unfortunately ; for, as will be familiar to all, the address by Professor Koch before the British Tuberculosis Congress in July, dealt in a sensational manner with this very matter of the relationship between the human and bovine tuberculosis, and it has left the impression upon many that human and bovine tuberculosis are to be regarded as absolutely distinct diseases, due to what are, to all intents and purposes, distinct though allied species of bacilli. It is a matter of no small regret to us that we were unable to demonstrate at the proper time that this was not the case.

Into a discussion of Professor Koch's address I will enter more fully later ; in the meantime, I would point out how important it is for the settlement of this question and for the calming of the public mind as to the exact and intimate relationship between tuberculosis of cattle and of man respectively, to prove that the bacilli of human tuberculosis can be converted into bacilli having all the characteristics and properties of those found in cattle, and I would beg that authority be given to us to re-enter upon this, to me, most important and convincing series of investigations. Here I would call attention to the fact that so far as we have gone, we are firmly convinced that in general and under ordinary conditions, tubercle bacilli obtained from the bodies of infected cows show distinct differences from those obtained from human beings. As already reported, Dr. Higgins two years ago found that a culture of tubercle bacilli obtained from man had no effect when inoculated into a cow, herein confirming the observations of Frothingham (1897), Theobald Smith (1898), and others. Now he is able to report another case to the same effect (*Vide* pp. 138 & 139). Two very similar animals, both reacting to tuberculin, but both in good condition and showing no clinical evidence of the disease, were inoculated in the udder with like quantities of cultures of human and bovine bacilli respectively, in order to determine whether active tuberculosis could be set up. As mentioned in previous reports, we have been unable to obtain in this neighbourhood any cattle presenting this form of udder disease. Further, we desired to determine whether existing tuberculosis acted as a preventive to second infection of the same disease. Some of Koch's earliest observations on guinea pigs rather seemed to point in this direction, and it may be noted that in man the existence of active syphilis is a preventive of second infection with that disease, and syphilis and tuberculosis appear to belong to the same group of chronic granulomatous infections.

The animal inoculated with bovine tubercle bacilli soon showed abundant tubercle bacilli in her milk, and all the evidences of extensive tuberculosis of the udder ; it is interesting to note that this second infection appears to have remained local, and not to have set up a rapidly generalizing tuberculosis ; she was killed at the end of twenty months, when slight and apparently fairly generalized but arrested tuberculosis was found in various lymph glands, associated with extensive tuberculosis of the udder. These results are, at least, suggestive. The other animal (inoculated with the human bacilli), when killed at the end of nineteen months, had ceased to react to tuberculin, and exhibited merely old encapsulated tuberculous foci in the lungs and in certain glands, with small, more recent tubercles in the lungs and liver, while at the site of inoculation there was not a sign of tuberculosis, the udders being completely free from the disease.*

* It is worthy of note that Lartigau in his studies upon the variation and virulence of the bacillus tuberculosis in man (*Journal of Medical Research*, N.S., Vol. 1, No. 1, 1901, p. 156), describes a case of a man in which there was found extensive miliary tuberculosis in both lungs, bronchi and upper air passages, while the right knee joint showed an old, very fibrous

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The observations here recorded (p. 137) on the fate of human and bovine tubercle bacilli contained in permeable capsules within the peritoneal cavities of cattle and other animals, seem to indicate that a year is too long to allow the vitality of bacilli so treated to be preserved, although I should note that Ravenel has been able to gain cultures after eleven months' retention in such capsules. In these celloidin capsules the bacilli cannot escape into the system, nor can they be directly acted upon by the cells of the body. They are nourished by the body juices, which diffuse through the walls of the capsule, while the toxic substances given off by the bacilli in their growth are, as indicated by Dr. McCrae's work upon typhoid bacilli in this laboratory (*Journal of Experimental Medicine*, vol. V., 1901, p. 635), diffused out into the tissues. Whether the death of the imprisoned bacilli is due to the gradual accumulation of antitoxic and antibacterial substances of the body juices which, diffusing into the capsule, act upon the bacilli, or whether there is gradually formed a fibrous wall around the capsules, rendering diffusion inwards and outwards more and more difficult and nourishment of the imprisoned bacilli more and more imperfect, must, for the present, be left an open question.

Another line of research which has for some months been carried on by Dr. Higgins cannot here be reported save as being in progress, I refer to the methods for gaining the rapid development of the tubercle bacilli. One of the greatest difficulties in the study of experimental tuberculosis lies in the length of time requisite to gain culture of the bacilli. When adequate cultures of the bacilli are not obtainable under three weeks to a month, it will be understood how slow the advance of research, of necessity, must be. Already in several laboratories during the last two years, attempts have been made, with more or less success, to gain rapid growth by the employment of media other than those introduced by Koch, Roux and Nocard, which have been in general use until the present. I can only state that the methods here elaborated promise success in this direction.

With regard to Dr. Higgins's report upon other investigations, that upon anthrax explains itself. In reference to his detection of typhoid bacilli in contaminated water from the ss. *Montezuma*, it is worthy of note that this is one of the very few cases in which the presence of the typhoid bacilli have been surely detected in infected water.* The earlier reports of such detection must be discredited, for only of late years have we come to realize how peculiarly difficult it is to distinguish between the typhoid and the colon bacilli, this latter being a common contamination of water. In Dr. Higgins's hands Hankin's method, carefully carried out, gave positive results, which were confirmed by the Widal test, a fact deserving of note because recently certain German observers have sought to discredit the method.

ON THE RELATIONSHIP BETWEEN HUMAN AND BOVINE TUBERCULOSIS.

As one of the delegates from the government, it was my privilege to attend the British Congress on Tuberculosis, held in London, in July of this year. It is no exaggeration to say that at that congress every other contribution was thrown into the shade by Koch's remarkable address, as again, that no utterance on a medical subject has caused so general an excitement throughout the civilized world since Koch's previous announcement concerning tuberculin.

As the matter in that address which has caused so much sensation, is directly in line with the trend of our observations during the last three years, it is fitting that I should here discuss fully the stand taken by Koch, and this more especially since his

tuberculosis in which no tubercle or tubercle bacilli would be detected on section. From the region of the knee and from the lungs he obtained cultures of differing virulence, that from the acute pulmonary tuberculosis being of great virulence for rabbits and guinea pigs, the other of distinctly attenuated type. As he suggests, these findings indicate inhalation infection wholly independent of the old focus of attenuated tubercle bacilli in the knee.

utterances have had a distinctly unsettling effect upon those interested in the arrest of tuberculosis among cattle, and have a bearing upon the legislative measures to be taken to arrest the spread of the disease in the community at large.

When in 1884 Koch published in the second volume of the '*Mittheilungen*,' of the German Imperial Health Office, the classical account of his researches upon the tubercle bacillus and the relationship of the same to different forms of tubercular disease in man and animals, he laid down with the greatest precision that there was but one form of tubercle bacillus, that grape disease (*Perlsucht*) in cattle, tubercular phthisis or pulmonary consumption in man, and tuberculosis in the domestic animals, are caused by one and the same micro-organism. This view was not based upon isolated observations—he studied 19 cases of miliary tuberculosis in man, 29 cases of pulmonary phthisis, tuberculous ulcers of the tongue, tuberculosis of the womb, testicles, &c., 21 cases of scrofulous lymphatic glands, 13 cases of tuberculous joints, 10 cases of tubercular bone affections, 4 of lupus—all these in man—and 17 cases of grape disease in cattle; while he made experimental inoculations with the bacilli obtained from all these cases into some 273 guinea pigs, 105 rabbits and numerous other smaller animals, including rats, cats, dogs, pigeons, hens, &c. It was a most remarkable and exhaustive piece of work. And when he declared after all this prolonged study of years, that the organisms isolated from man and cattle were identical, it is not surprising that his view was almost universally accepted, although this was counter to the teaching of Virchow, the great German pathologist, who, since 1863, had laid down that tuberculosis in man and grape disease in cattle were two distinct diseases.

From Virchow's address to the Berlin Medical Society, July 29, 1901 (*Berliner Klinische Wochenschrift*, August 5, 1901, p. 819), it would appear that at the Charité-Hospital in Berlin they have from time to time collected material from cases of human peritoneal tuberculosis, showing massive tubercular growths quite unlike the ordinary tuberculosis of the abdominal cavity in man, and resembling more those characteristic of the bovine disease, thus indicating, so far as I follow Virchow, that despite the general acceptance of the view enunciated by Koch and the disrepute into which his own earlier opinion had fallen, Virchow had, since 1884, still upheld that earlier opinion regarding the want of identity between the two diseases. But for years Koch's conclusion was unreservedly accepted by pathologists in general, by veterinarians and those interested in hygiene, the view, namely, that one form of bacillus causes all forms of tuberculosis in the different species of animals.

The first check to these views came from Italy and France, when it was shown by Mafucci (1889), and by Cadiot, Gilbert and Roger (1890), that the bacilli obtained from fowls, pheasants and other birds suffering from tuberculous disease, grow more readily, and in their growth and in their action upon the animals of the laboratory, differ markedly from the tubercle bacilli isolated from man (*vide report for 1899*, p. 139), and in 1890, at the International Congress in Paris, Koch admitted these differences. As I have already pointed out (*ibid*) the researches of Nocard and Roux have clearly indicated that these differences in properties are not due to the existence of two absolutely distinct species of bacilli, but to the fact that bacilli grown and passed from member to member of one species gradually assume characters different from those assumed by the bacilli of like origin, infecting and passing through members of another species of animal. The extreme example of this difference in the characters of different races of tubercle bacilli is to be met with in fish. It has been found by more than one observer that fresh water fish, such as carp, fed for a long period with the sputum of human tuberculous patients may eventually develop swellings of an inflammatory type from which tubercle bacilli can be obtained, growing easily at the ordinary temperature on the usual media employed for this purpose (whereas tubercle bacilli obtained direct from man only grow at the body temperature and then only with difficulty). These piscine bacilli when inoculated into rabbits and guinea pigs are found to be remarkably attenuated and lessened in their virulence. I learn that Professor

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Harrison and Mr. Ross, of the Guelph Agricultural College, have repeated and confirmed these experiments.

It is not surprising therefore that differences have been made out between the tubercle bacilli derived from cases of tuberculosis in man and cattle respectively. As a matter of fact, as already reported, Theobald Smith has more especially called attention to the differences in the cultures and the appearance of the bacilli, differences which we have been able fully to confirm (*ibid.*, p. 139), while several observers have noted either that tuberculous sputum from man when fed to calves, had no effect upon them, or, that pure cultures of the bacilli isolated from lesions in man were similarly without effect, at most leading to a localised disturbance at the point of inoculation with little or no liability to lead to generalized disease. (Chauveau in France, Gunther and Harms and Bollinger (1894), in Germany, Sydney Martin (1895), in England, Frothingham (1897), Theobald Smith (1898), and Dinwiddie (1899), in the United States.

We so fully accepted these results in 1899, that we only tested the matter upon one heifer, using large quantities of human tubercle bacilli and obtaining no result (*ibid.*, p. 147). The control heifer which received a like inoculation of bovine bacilli died of generalized tuberculosis in forty-two days. But one English observer, Crookshank, obtained positive results, as I have previously noted (*ibid.*, p. 140), and as Crookshank himself acknowledged at London Congress, his case is peculiar, and is to be explained not as a pure tubercle infection, but as an example of a mixed infection, the suppurative disturbance and consequent lowered resistance in the calf favouring the multiplication of the tubercle bacilli and the development of a generalized tuberculosis. It may be noted here that in one of Dr. Higgin's capsule experiments, where the capsule containing human tubercle bacilli ruptured, a few small tubercles were found in the neighbourhood. These were clearly arrested in their development.

Thus, previous to Koch's address, it was well known to those interested in the subject, that differences existed in the bacilli obtained from man and the cow : that human tubercle bacilli only occasionally and under special conditions are capable of causing tuberculosis in cattle, and that these do not cause nearly so virulent and rapid a development of the disease when inoculated into rabbits and guinea pigs. The question had already been mooted as to whether bovine tubercle bacilli, being more virulent for the lower animals, are also specially virulent for man, or whether the reverse was the case, so that passage of the tubercle bacilli through a series of cattle, while leading these to be more dangerous for cattle and for the animals of the laboratory, renders them less capable of setting up infection in man.

In this connection, before coming to deal directly with Koch's address, it is but right that I should here note that in August, 1899, at the meeting of the Canadian Medical Association at Toronto, I delivered an address upon bovine tuberculosis and its significance, and upon the possibility of its eradication in Canada, in which I cautiously drew attention to the fact that the evidence in favour of the view that bovine tuberculosis is transmissible to man, was not so strong as was generally thought to be ; that while cases did exist of such transmission, they were few in number ; and I concluded, therefore, that inasmuch as it was with great difficulty that human tuberculosis was conveyed to cattle and *vice versa*, it was therefore quite possible for us here in Canada to proceed to eradicate bovine tuberculosis from district after district of the Dominion, and this, even when measures for eradicating human tuberculosis were either ineffective or not put into action. This paper was taken at the time, by certain critics, to mean that I did not believe that tuberculosis was transmitted from cattle to man ; that I never stated, nor have I since then believed or urged this to be the case. I believe that it is transmissible under certain favourable conditions, but that it is comparatively rarely transmitted. Throughout I was most careful to point out that this question of the transmissibility of the disease from one species

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to the other should not in any way lead to lessened restrictions or diminished endeavours to eradicate tuberculosis from cattle, but that, on the contrary, as already stated, the less the extent of transmission from the one species to the other the greater the hope of eradicating the disease from among our cattle, the greater the hope also of materially benefiting the Canadian farmer.

PROFESSOR KOCH'S ADDRESS.

In discussing Dr. Koch's celebrated address, it is but right, in the first place, to call attention to the fact that it was not directly, but only incidentally, upon the subject of the relationship of human and bovine tuberculosis, the full title given by him being 'The Combatting of Tuberculosis in the Light of the Experience that has been gained in the Successful Combatting of other Infectious Diseases.' The distinguished writer laid down, in the first place, that the most important lesson we have learnt from experience is that it is a great blunder to treat pestilences uniformly. He pointed out that in the case of the plague, for example, we have learnt that human plague is dependent upon rat plague, that the real transmitters of the disease are rats, and that, therefore, to stamp out the disease, we have to destroy the rats in a region; that with cholera the main propagator is water, and that, in combatting this disease, water is therefore the first thing to be considered. The compulsory muzzling of dogs has had remarkable effects in freeing Great Britain from hydrophobia, and leprosy has from early days been combatted by isolation. Thus, to select the right means of eradicating tuberculosis, we must determine what is the root of the evil, and must not squander force in subordinate, ineffective measures, and, to arrive at a satisfactory result, we must, in the first place, inquire how infection takes place in tuberculosis.

He showed that we have abundant evidence that the disease is mainly set up by inhalation, and that the sputum of consumptive people is to be regarded as the main source of the infection with tuberculosis. He took it that upon this point all were agreed. He next asked whether there were not other sources also copious enough to demand consideration in the combatting of tuberculosis. Taking these into consideration, he indicated that hereditary tuberculosis, while not absolutely non-existent, is so extremely rare that in considering practical measures, we are at liberty to leave this form of origin entirely out of the question. It was at this point he discussed next the possibility of tubercular infection by the transmission of the germs of the disease from tubercular animals to man. Here it would be well to give his exact words :—

'This manner of infection is generally regarded nowadays as proved, and as so frequent that it is even looked upon by not a few as the most important, and the most rigorous measures are demanded against it. In this congress also the discussion of the danger with which the tuberculosis of animals threatens man will play an important part. Now, as my investigations have led me to form an opinion deviating from that which is generally accepted, I beg your permission, in consideration of the great importance of this question, to discuss it a little more thoroughly.

'Genuine tuberculosis has hitherto been observed in almost all domestic animals, and most frequently in poultry and cattle. The tuberculosis of poultry, however, differs so much from human tuberculosis that we may leave it out of account as a possible source of infection for man. So, strictly speaking, the only kind of animal tuberculosis remaining to be considered is the tuberculosis of cattle, which, if really transferable to man, would indeed have frequent opportunities of infecting human beings through the drinking of the milk and the eating of the flesh of diseased animals.

'Even in my first circumstantial publication on the etiology of tuberculosis I expressed myself regarding the identity of human tuberculosis and bovine tubercul-

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osis with reserve.* Proved facts which would have enabled me sharply to distinguish these two forms of the disease were not then at my disposal, but sure proofs of their absolute identity were equally undiscoverable, and I therefore had to leave this question undecided. In order to decide it, I have repeatedly resumed the investigations relating to it, but so long as I experimented on small animals, such as rabbits and guinea pigs, I failed to arrive at any satisfactory result, though indications which rendered the difference of the two forms of tuberculosis probable were not wanting. Not till the complaisance of the Ministry of Agriculture enabled me to experiment on cattle, the only animals really suitable for these investigations, did I arrive at absolutely conclusive results. Of the experiments which I have carried out during the last two years along with Professor Schütz, of the Veterinary College in Berlin, I will tell you briefly some of the most important.

‘A number of young cattle which had stood the tuberculin test, and might therefore be regarded as free from tuberculosis, were infected in various ways with pure cultures of tubercle-bacilli taken from cases of human tuberculosis; some of them got the tubercular sputum of consumptive patients direct. In some cases the tubercle-bacilli or the sputum were injected under the skin, in others into the peritoneal cavity, in others into the jugular vein. Six animals were fed with tubercular sputum almost daily for seven or eight months; four repeatedly inhaled great quantities of bacilli, which were distributed in water, and scattered with it in the form of spray. None of these cattle (there were nineteen of them) showed any symptoms of disease, and they gained considerably in weight. From six to eight months after the beginning of the experiments they were killed. In their internal organs not a trace of tuberculosis was found. Only at the places where the injections had been made small suppurative foci had formed, in which few tubercle-bacilli could be found. This is exactly what one finds when one injects dead tubercle-bacilli under the skin of animals liable to contagion. So the animals we experimented on were affected by the living bacilli of human tuberculosis exactly as they would have been by dead ones; they were absolutely insusceptible to them.

‘The result was utterly different, however, when the same experiment was made on cattle free from tuberculosis with tubercle-bacilli that came from the lungs of an animal suffering from bovine tuberculosis. After an incubation-period of about a week the severest tubercular disorders of the internal organs broke out in all the infected animals. It was all one whether the infecting matter had been injected only under the skin or into the peritoneal cavity or the vascular system. High fever set in, and the animals became weak and lean; some of them died after a month and a half to two months, others were killed in a miserably sick condition after three months. After death extensive tubercular infiltrations were found at the place where the injections had been made, and in the neighbouring lymphatic glands, and also far advanced alterations of the internal organs, especially the lungs and the spleen. In the cases in which the injection had been made into the peritoneal cavity the tubercular growths which are so characteristic of bovine tuberculosis were found on the omentum and peritoneum. In short, the cattle proved just as susceptible to infection by the bacillus of bovine tuberculosis as they had proved insusceptible to infection by the bacillus of human tuberculosis. I wish only to add that preparations of the organs of the cattle which were artificially infected with bovine tuberculosis in these experiments are exhibited in the Museum of Pathology and Bacteriology.

‘An almost equally striking distinction between human and bovine tuberculosis was brought to light by a feeding experiment with swine. Six young swine were fed daily for three months with the tubercular sputum of consumptive patients. Six

* I have carefully read through Professor Koch's ‘first circumstantial publication,’ and found in it no signs of the reserve here mentioned. The impression given to the whole scientific world by that paper was that Koch had proved the identity of the two conditions and disproved the teaching of Virchow and others, who held their non-identity.

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other swine received bacilli of bovine tuberculosis with their food daily for the same period. The animals that were fed with sputum remained healthy and grew lustily, whereas those that were fed with the bacilli of bovine tuberculosis soon became sickly, were stunted in their growth, and half of them died. After three months and a half the surviving swine were killed and examined. Among the animals that had been fed with sputum no trace of tuberculosis was found, except here and there little nodules in the lymphatic glands of the neck, and in one case a few gray nodules in the lungs. The animals, on the other hand, which had eaten bacilli of bovine tuberculosis had, without exception (just as in the cattle experiment), severe tubercular diseases, especially tubercular infiltration of the greatly enlarged lymphatic glands of the neck and of the mesenteric glands, and also extensive tuberculosis of the lungs and the spleen.

‘The difference between human and bovine tuberculosis appeared not less strikingly in a similar experiment with asses, sheep, and goats, into whose vascular systems the two kinds of tubercle-bacilli were injected.

‘Our experiments, I must add, are not the only ones that have led to this result. If one studies the older literature of the subject, and collates the reports of the numerous experiments that were made in former times by Chauveau, Günther and Harms, Bollinger, and others, who fed calves, swine, and goats with tubercular material, one finds that the animals that were fed with the milk and pieces of the lungs of tubercular cattle always fell ill of tuberculosis, whereas those that received human material with their food did not. Comparative investigations regarding human and bovine tuberculosis have been made very recently in North America by Smith, Dinwiddie and Frothingham, and their result agreed with that of ours.* The unambiguous and absolutely conclusive result of our experiments is due to the fact that we chose methods of infection which excluded all sources of error, and carefully avoided everything connected with the stalling, feeding, and tending of the animals that might have a disturbing effect on the experiments.

‘Considering all these facts, I feel justified in maintaining that human tuberculosis differs from bovine, and cannot be transmitted to cattle. It seems to me very desirable, however, that these experiments should be repeated elsewhere, in order that all doubts as to the correctness of my assertion may be removed.

‘I wish only to add that, owing to the great importance of this matter, the German government has appointed a commission to make further inquiries on the subject.

‘But, now, how is it with the susceptibility of man to bovine tuberculosis? This question is far more important to us than that of the susceptibility of cattle to human tuberculosis, highly important as that is too. It is impossible to give this question a direct answer, because, of course, the experimental investigation of it with human beings is out of the question. Indirectly, however, we can try to approach it. It is well known that the milk and butter consumed in great cities very often contain large quantities of the bacilli of bovine tuberculosis in a living condition, as the numerous infection-experiments with such dairy products on animals have proved. Most of the inhabitants of such cities daily consume such living and perfectly virulent bacilli of bovine tuberculosis, and unintentionally carry out the experiment which we are not at liberty to make. If the bacilli of bovine tuberculosis were able to infect human beings, many cases of tuberculosis caused by the consumption of alimenta containing

* As I have pointed out elsewhere (*Canadian Journal of Medicine and Surgery*, November, 1901), and as others in the United States have noted, Koch here by no means gives to American workers the credit that is their due. In 1893, Gaiser, working under Baumgarten, of Tübingen, had inoculated one cow with human, another with bovine bacilli, and had obtained negative results with the former and rapidly developing miliary tuberculosis with the latter. This, it will be seen, was a single observation, and it attracted little attention. The credit lies with Frothingham, Theobald Smith and Dinwiddie, who, by carefully planned experiments, free from all sources of error, established the fact that cattle are in general immune to pure cultures of tubercle-bacilli derived from man. Koch and Schütz at most confirmed these observations, which, it may be added, appeared before these last observers began their series of studies.

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tuercle-bacilli could not but occur among the inhabitants of great cities, especially the children. And most medical men believe that this is actually the case.

‘In reality, however, it is not so. That a case of tuberculosis has been caused by alimenta can be assumed with certainty only when the intestine suffers first,—i.e., when a so-called primary tuberculosis of the intestine is found. But such cases are extremely rare. Among many cases of tuberculosis examined after death, I myself remember having seen primary tuberculosis of the intestine only twice. Among the great post-mortem material of the Charité-Hospital in Berlin, ten cases of primary tuberculosis of the intestine occurred in five years. Among 933 cases of tuberculosis in children at the Emperor and Empress Frederick’s Hospital for Children, Baginsky never found tuberculosis of the intestine without simultaneous disease of the lungs and the bronchial glands. Among 3,104 post-mortems of tubercular children, Biedert observed only sixteen cases of primary tuberculosis of the intestine. I could cite from the literature of the subject many more statistics of the same kind, all indubitably showing that primary tuberculosis of the intestine, especially among children, is a comparatively rare disease, and of these few cases that have been enumerated, it is by no means certain that they were due to infection by bovine tuberculosis. It is just as likely that they were caused by the widely propagated bacilli of human tuberculosis, which may have got into the digestive canal in some way or other—for instance, by swallowing saliva of the mouth. Hitherto nobody could decide with certainty in such a case whether the tuberculosis of the intestine was of human or of animal origin. Now we can diagnose them. All that is necessary is to cultivate in pure culture the tubercle-bacilli found in the tubercular material, and to ascertain whether they belong to bovine tuberculosis by inoculating cattle with them. For this purpose I recommend subcutaneous injection, which yields quite characteristic and convincing results.* For half a year past I have occupied myself with such investigations, but, owing to the rareness of the disease in question, the number of the cases I have been able to investigate is but small. What has hitherto resulted from this investigation does not speak for the assumption that bovine tuberculosis occurs in man.

‘Though the important question whether man is susceptible to bovine tuberculosis at all is not yet absolutely decided, and will not admit of absolute decision to-day or to-morrow, one is nevertheless already at liberty to say that, if such a susceptibility really exists, the infection of human beings is but a very rare occurrence. I should estimate the extent of infection by the milk and flesh of tubercular cattle, and the butter made of their milk, as hardly greater than that of hereditary transmission, and I therefore do not deem it advisable to take any measures against it.”

After these statements, he concludes that the only main source of infection of tuberculosis being the sputum of consumptive patients, the measures for the combating of tuberculosis must aim at the prevention of the dangers arising from its diffusion. And from this point he proceeds to take up over-crowding, bad hygienic conditions, sanitararia, and so on.

Let me discuss the above statements. It will be seen that they divide themselves into three parts : (1) a study of the transmissibility of human tuberculosis to cattle ; (2) a study of the transmissibility of bovine tuberculosis to man, and (3) the conclusions to be drawn from the facts and inferences set forth. It will be well to consider these in order.

1.—The Transmissibility of Tuberculosis from Man to Cattle.

From what I have stated in my preliminary remarks, and from this additional evidence afforded by Koch and Schütz, it must be accepted that experimental inoculation of pure cultures of tubercle bacilli derived from man (bacilli which are virulent

* This method had been previously recommended by Theobald Smith.

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for rabbits and guinea pigs), leads to little or no result in cattle; the bacilli are practically harmless. It must, however, be clearly recognized that this is not the same as saying that human tuberculosis is never conveyed to cattle for (i), as Hueppe points out, different breeds of domestic animals react differently towards various diseases. Most breeds of swine are insusceptible to anthrax, and this led to the statement that this disease cannot be given to them, but more recently some breeds are recorded as being liable to succumb thereto. It is possible that further study will show that certain cattle can be infected with pure cultures of the tubercle bacilli. At most it may be laid down that the results gained by observers in widely separated regions in Europe and America upon the effects of inoculating young cattle (which are more susceptible and less resistant to tuberculosis and infectious diseases in general than are fully grown animals), indicate that the majority of cattle are not liable to be infected by human tubercle bacilli.*

(ii) A more important consideration is that we must clearly distinguish between experimental and natural infection. Because under the conditions of the experiments observers have obtained negative results, it does not follow that under all conditions infection cannot be conveyed. As a matter of fact, we realize more and more that the mere presence of virulent bacteria is not sufficient to set up the disease, that an equally important factor is the condition of the system. Thus, in connection with this very matter of tuberculosis in man, we know that while all are exposed to infection, at most 7 per cent die of the disease; those in good health resist infection; that this infection is specially liable to occur when the system has been lowered by other infectious disease, so that an attack of tuberculosis is notably liable to be dated from an attack of la grippe, pneumonia, typhoid or other acute infection. So it may well be that natural infection is possible; indeed, Crookshank's observation, already referred to, proves that this is the case. It will be remembered that injecting under the skin of the calf sputum from cases of phthisis, he introduced also supplicative microbes, and caused abscess formation, and when the animal died found distinct evidence of acute, though not very extensive, tubercular infection. Delépine, of Manchester, during the last few weeks, would appear to have obtained results of a like order. Judging from his preliminary note, he is causing tuberculosis in calves by injecting a mixture of phthisical sputums, containing tubercle bacilli derived from several individuals,—together with other micro-organisms.

Ravenel's observations, communicated also to the British Congress, clearly point to the same conclusion. He found, taking four calves and inoculating them intraperitoneally with 10 ccm. of human tuberculous sputum from different sources, but all containing a large number of tubercle bacilli, that one showed no ill effects, and at the autopsy was found to be entirely free from the disease; the other three all became infected with tuberculosis, the lesions in two being quite extensive. Making an emulsion from the material of well developed tubercular nodules of these last two cases, he inoculated 20 cc. of these emulsions, which were found rich in bacilli, into two other calves. The result was absolutely negative in the one animal, practically so in the other. Ravenel concludes that since both these calves received a much larger number of tubercle bacilli in the emulsion than did those which were inoculated directly with the sputum, the development of the disease in the latter must have been due to a mixed infection which operated to the advantage of the tubercle bacilli. The attempt to infect two calves with human sputum by the digestive tract failed wholly. Herein he confirmed the previous results of Sydney Martin and the earlier French and German observers, and Koch's recent results.

It is generally held that, in experimental inoculations, one overcomes the resistance of the body tissues by introducing microbes in very much greater quantity than ever

* The wholly contradictory results obtained by Koch and Ravenel in connection with the transmission of human tuberculosis to swine is best explained along these lines—i.e., that they employed different breeds.

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by any possibility gain entrance in the course of a natural infection. As I have emphasized in previous reports, the number of pathogenic bacteria introduced is one factor in the production of disease. Where a mixed infection is set up the suppurative microbes, growing rapidly, may permit the human tubercle bacilli introduced at the same time to grow with little hindrance until their number is so great as to overcome the resistance of the tissues, and so gain a definite foothold. What is more, it may be that these other microbes in their growth may give the bacilli time to 'accommodate' themselves to the changed conditions of existence, so that gradually they assume properties harmful to the organism of their host. The power we possess of making the tubercle bacilli from birds grow in rabbits, &c. (Nocard, Hueppe and Fischel), affords evidence of this accommodation; Ravenel's observations (University of Pennsylvania Medical Bulletin, Sept., 1901), that 'human' bacilli passed through hogs gains an increased virulence for guinea pigs and rabbits, points in the same direction.

Striving to balance these various factors and possibilities I am inclined to conclude that while human tuberculosis may be conveyed to cattle, circumstances favouring this transmission under natural conditions will be found to occur very rarely, so rarely that, for practical purposes, we may neglect this as a cause of tuberculosis in cattle. Or in other words, it is safe to lay down as a practical rule that tuberculosis developing in cattle is derived from previous cases of the disease in other cattle, or it may be in other herbivorous animals and from these only. From which it follows that measures calculated to lead to the eradication of bovine tuberculosis may be undertaken with a full prospect of success even in districts where human tuberculosis is frequent and is permitted to continue unchecked.

2.—On the Transmissibility of Bovine Tuberculosis to Man.

Under the above heading, as indeed was the case in the previous section, two distinct issues have to be considered ; (i), the possibility of transmission, and (ii), the relative frequency of such transmission of the disease from the one to the other species. Most writers on the subject, have confused the two, yet a little consideration will show that they are not directly related. It is possible, for example, that while tuberculosis may be transmitted from cattle to man, Professor Koch's conclusion is in the main correct, namely, that it occurs so rarely as to be outside the range of practical politics. Or otherwise, in order to prove the extent to which this transmission is a danger to the community, and to determine the need for special legislation, the demonstration of a definite case or cases of transmission having occurred, is not all that is needed ; it is necessary to show that transmission occurs with sufficient frequency to constitute a menace to the well-being of the community.

Let me be permitted here to anticipate matters and state that I am of an open mind upon this point ; that, on the one hand with Baumgarten and Ribbert and other German authorities who wrote prior to Koch's latest utterance, I believe that the danger has been exaggerated ; that I believe the transmission to be infrequent ; but that, on the other hand, I consider that the transmission has been demonstrated ; that it is more frequent than Koch has indicated ; that in one class of the community, namely, little children, the transmission does occur and this through the use of infected cow's milk ; that I hold that even if this be so, a far greater danger from milk, a far more alarming cause of infant mortality are the other contaminations to which milk is liable, so that our first thought should be how to reduce these other contaminations. I am of an open mind as to how far there should be special legislation for the prevention of the use of tuberculous milk over and above legislation, and municipal regulations, tending to insure the freedom of milk from infective properties in general (tuberculous infection included). Having thus briefly indicated my position I will now proceed to state, as impartially as possible, the evidence we possess, for and against, upon these matters, so that the reader may form his own conclusions :

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The Transmission of Tuberculosis from Cattle to Man.

It must, in the first place be noted, that Koch nowhere denies in his address, categorically, the possibility that such transmission does occur ; the most he states is that if it exists it is of very rare occurrence. As a matter of fact the occurrence has been absolutely demonstrated. There are several cases on record in which veterinarians and butchers when cutting up the bodies of tuberculous cattle, have wounded and thus infected themselves and subsequently manifested the symptoms of local and generalised tuberculosis. Ravenel, of Philadelphia, brought forward some five cases of this nature at the British Congress. In the Philadelphia Medical Journal of July 21, 1900, he quotes three cases which had come under his immediate observation. Two similar cases are recorded by Tscherning and Pfeiffer, and he gives two other cases in which there might be some doubt.

There are other cases in which it is impossible to reach any other conclusion than that there has been definite infection brought about by drinking the milk of cows suffering from advanced tuberculosis. The most recent collection and critique of these cases is by Professor Repp (American Medicine, October 26, 1901, p. 645, and November 2, p. 688), Professor of Pathology and Veterinarian to the Iowa State College, namely, cases by Olivier, Stang, Demme, Hills, Ernst, Leonhardt, Sontag, Hermsdorf and Rich.*

To summarize, we have cases in which members of a family brought up on the milk of cows found to be tuberculous have died of tuberculosis, while other members, who have not used this milk, have remained healthy ; cases in which several infants at children's hospitals or girls at school have nearly simultaneously shown evidence of intestinal tuberculosis, and the number of cases raising suspicion, the cows affording milk to the institutions have been examined and found to be in an advanced state of tuberculosis ; cases in which children brought up on the milk of one cow have developed the disease and the cow has been later condemned as suffering from advanced tuberculosis. The evidence thus must be regarded as clear and convincing that the transmission is possible.

On the Frequency of such Transmission.

(a) *Through Wounds.*—The direct introduction of tuberculous material into the system through gross wounds is in itself a rare event. Beyond demonstrating that bovine tuberculosis can thus be the cause of human infection it is doubtful whether cases of this order have a high value for our present purpose ; at most, that is to say, personal care and the full recognition that the disease may be conveyed by this means can be of avail ; legislation can be of no effect.

These doubts are increased when it is remembered that we have evidence pointing to the fact that all cases of wound infection with bovine tubercular material do not lead to the development of tubercular disease in man, even when large numbers of tubercle-bacilli are introduced into the system which have been gained from pure cultures. Baumgarten, for example (Berlin, klin. Wochenschrift, September 2, 1901, p. 894), has recorded a case of a physician working in his laboratory at Tübingen who, accepting the view of Rokitansky that tuberculosis and cancer are antagonistic

* Repp also quotes as evidence Thorne's report that 22 physicians out of 339 practising in Ohio replied in the affirmative to the question 'Have you been able to trace any case of tubercular disease to the milk of unhealthy cows?' and that 33 replied affirmatively to the question 'Have you had reason to suspect the origin of tubercular disease in older children or adults to be in the milk or meat supplied?' So few show themselves to have a correct appreciation of what constitutes positive evidence, that these mere affirmative and negative answers of practitioners of Ohio cannot be held to be of any value ; to arrive at a judgment it will be necessary to know the facts of the individual cases. On the other hand it is but right that I should note that, talking over this subject with medical men of various districts, I have heard of unpublished cases (unpublished because one or two links in the evidence appeared to be a little weak), which, however, have left little room for doubt.

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diseases, the one never developing when the other is present, inoculated more than half a dozen patients suffering from inoperable malignant tumours, with pure cultures of bovine bacilli. He did not, it is true, cure the patients ; we now know that Rokitansky's statement was incorrect, the two diseases can occur together, and among others Dr. W. F. Hamilton, of this city, has brought together cases of their co-existence. But on the other hand, not one of these patients developed tuberculosis. An abscess formed at the site of inoculation which gradually healed, and when Baumgarten performed the post mortems, he discovered merely scar tissue at the site of inoculation and neither by the naked eye nor under the microscope could he find a single evidence of the development of tuberculosis in any part of the system.

One who is now a well known writer on veterinary subjects, a former pupil of our school, has reminded us that while engaged some years ago in Montreal in removing puriform material from a suspected tuberculosis mass in a cow in order to test its nature by inoculating into a guinea pig, the animal lurched, causing the needle of the filled syringe to penetrate deeply into the ball of the thumb. The guinea pig subsequently inoculated died of virulent tuberculosis ; the deep wound in his thumb muscles healed completely and no ill results ever showed themselves.

These observations must not be taken as contradictory, but rather as being in harmony with what I have already stated to the effect that infection is not purely determined by the presence of bacteria. They, however, may be accepted as clearly indicating that bovine tubercle-bacilli are not more virulent for man than are tubercle-bacilli of human origin.

Dr. Ravenel, in his remarkable paper already referred to, read before the British Congress on Tuberculosis, remarks: 'Accepting it as proven that the bovine tubercle-bacillus has, as a rule, considerably greater pathogenic power than the human bacillus for a large majority of experimental animals, how should we interpret this as regards man ? Is it fair to conclude that this increase of virulence will hold good for man also ? Until the contrary is proven, or until good reason for believing the contrary is shown, it is in my judgment right that this conclusion be held at least as a working hypothesis. I am aware of the objections to this view which will be raised by some and acknowledged freely that it cannot be accepted as conclusive.'

The above observations seem to me clearly to afford proof that we are not justified in concluding that because the bovine bacilli are more virulent for guinea pigs and rabbits, they are therefore more virulent for man.

Granting, as I have shown, that under certain conditions and in certain cases bovine tuberculosis is transmissible to man, it is at the same time very remarkable how singularly rare are the cases which afford reasonably sure grounds for being certain that infection has been through the milk. The number of clear cases may be counted upon the fingers of the two hands and this notwithstanding the fact that for seventeen years the identity of human and bovine tuberculosis has been generally accepted. Not one clear case or series of cases by an individual observer, has been published per annum. And this notwithstanding that tuberculosis ranks as our greatest zymotic scourge, and notwithstanding the fact that in some countries from 30 to 50 per cent of all milch cattle give evidence of the disease.

There are, it is true, reasons which possibly explain this state of affairs. First and foremost there is the long incubation period, or long period intervening between the moment of infection and the development of definite symptoms of the disease, this rendering it difficult to determine whether modes of infection other than through milk may not have been the cause. It will readily be understood that when the period of incubation is evidently variable and when two or three months may elapse before the symptoms appear, it is difficult to put one's finger upon a particular spot or period and say it was at that point or time that infection occurred,—especially when human tuberculosis is so generalized and there are so many possibilities that the infection may be traced to this latter source. Nevertheless, I am inclined to believe

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that this is not an adequate explanation of the rareness of these cases. It is remarkable that not a single case or series of cases has yet been recorded as occurring, even among children, fed from the milk of one 'milk round.' With typhoid, scarlet fever, and according to some authorities, diphtheria, we recognize local epidemics, sharply marked out, occurring among those and those only who have drunk the milk from a peculiar dealer. This never occurs with tuberculosis. Now, were the bovine tubercle-bacillus specially virulent for man, we ought to meet with such cases. We know that 70 per cent of the cattle, or more, on certain farms may be affected with this disease, that from 2 to 3 per cent of these cattle may be subject to tuberculosis of the udder and in their milk there may be literally millions of the active bacilli.

It is no sound argument to say that a distinction must be made between the tubercle-bacillus and the bacilli of the other diseases mentioned, because these grow rapidly in milk, whereas the tubercle-bacilli grow with peculiar slowness; and again, that the explanation is to be found in the fact that in a milk round the milk of a tuberculosis cow is so diluted with milk containing no bacilli, that at a given meal it contains a number insufficient to set up infection. At most this is but a partial explanation, whereby I mean that such diluted milk is found repeatedly by experiment capable of setting up tuberculosis in cows and even swine, and this to such an extent that in certain districts and states regulations have been framed forbidding swine to be fed with unsterilized skimmed milk from creameries. If thus calves and swine are liable to be infected by such milk and the mode of infection is in them clearly recognizable, why is it that we never find the same occurrence in man? The only possible explanation can be that the bovine tubercle-bacillus is not of specially high virulence for man, that in general it must be a susceptible individual who drinks milk containing relatively enormous quantities of the bacilli that is liable to be infected. So far, then, as we can justly draw any inference from the reported cases of definite infection from milk, it would seem that Koch rightly calls attention to the fact that 'If the bacilli of bovine tuberculosis were able to infect human beings, many cases of tuberculosis caused by the consumption of alimenta containing tubercle-bacilli, could not but occur among the inhabitants of great cities, especially the children, and that in reality this is not the case.'

But when we come to consider other aspects of this subject of infection through the milk we become more doubtful. All, I think, will agree that circumstantial evidence points to the fact that with increasing age individuals become less and less prone to infection with any form of tuberculosis. We have practically no evidence of those over 25 years of age becoming infected by bovine tuberculosis through the food. There remain, however, the children and young adults, and here the evidence is undoubtedly in favour of believing that milk does form a mode of setting up tuberculous infection. In our great cities, for example, upon this continent, tuberculosis in general is about as common as it is among the inhabitants of the great cities of Europe, and yet, as Dr. Northrup pointed out with regard to its appearance in the city of New York, and as Dr. Blackader has noted to me in connection with Montreal, tuberculosis of young children, and especially peritoneal and intestinal tuberculosis, is remarkably rare, whereas it is relatively common in London, Paris and other great European centres. For myself, although I have performed several hundred autopsies here in Montreal during the last nine years, I can recall but one case of primary tuberculosis of the abdominal cavity in a child under ten, and but four other cases in which there were grounds for considering that infection had been through the digestive system. Dr. Wyatt Johnston's much greater experience is in the same direction. Dr. Nicholls recalls one case in which he found a caseous mesenteric gland with no tuberculosis elsewhere, the child dying from another disease. Deaths from tuberculosis in this city average some 935 per annum, but according to the health report of the province for the year ending June, 1900, only three of these are put down as being due to abdominal tuberculosis in children under five, only four in children

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under fourteen. It is true that Koch points out the great infrequency of primary tuberculosis of the *intestine* at the Charité and Hospital for Children in Berlin, but I do not here refer to primary tuberculosis of the intestine merely, but to cases in which from the greater involvement of either the intestine or the mesenteric glands, it is reasonable to suppose that infection proceeded from the digestive tract ; for it is well known that in animals fed with tuberculous material there may be no obvious ulceration of the intestines, but definite enlargement and caseation of the mesenteric lymphatic glands which receive their lymph from the intestinal walls. These cases ought not to be left out of account ; nay, more, they are relatively common in European cities. Thus, at the Great Ormond Street Hospital for Children in London, Still found that of 769 autopsies on children under twelve years of age, 269 revealed tuberculous lesions, and in these cases no less than 23·4 per cent showed evidence of primary infection having been from the alimentary canal. Widerhofer, in Germany, found 101 out of 418 cases of tuberculosis in children, in which there was involvement of the intestine (or about the same proportion), and 42 per cent of these cases of intestinal tuberculosis were in children between the ages of two and five years.

This remarkable difference between the extent of primary abdominal tuberculosis in Europe and America would seem to be very possibly related to the relative frequency of bovine tuberculosis in the two areas. In this neighbourhood, for example, advanced bovine tuberculosis is extraordinarily rare, and in general the percentage of bovine diseases in the States is very much lower than it is in Europe. This, however, may possibly not be the only fact we have to take into consideration in explaining the rareness of infantile tuberculosis in America. In Europe this is most common in crowded cities, and the wretched hygienic conditions, the overcrowding, the bad atmosphere, the narrow streets, the back to back houses in the poorer quarters of the large cities, have much to answer for ; the children here, even the poorest classes, are not so poverty-stricken, and are brought up under healthier surroundings. Notwithstanding all this, I think these differences in the statistics of the two areas do point to infected milk being a factor in the frequency of tuberculosis among young children.

Certainly, Dr. Tatham's observations and Sir Richard Thorne-Thorne's impressive summary of the British statistics, cannot be gainsaid. If there has been in Great Britain during the last forty-five years a reduction of 27·9 per cent in the deaths from all forms of tuberculosis, if the reduction in phthisis reached 66 per cent, while the corresponding reduction from *Tabes mesenterica* only reached 3 per cent, it will be seen, to quote Thorne-Thorne, 'that in considering the latter cause of death, we are dealing with a totally different state of affairs. The matter, too, assumes a still more serious aspect if we limit ourselves to the first year of life, when milk is most largely used as food, for then we find that the reduction in the rate of deaths from the various forms of tuberculosis, which reduction has been going on at all ages for about half a century, not only disappears, but is actually transformed into a large increase, reaching no less than 27·7 per cent. This in itself is grave enough, but its significance is still further emphasized when we remember what are the circumstances under which this increase in the rate of death from *Tabes mesenterica* has gone on synchronously with the decrease in that of other forms of tuberculosis.'

For myself, I do not see how we are to explain these remarkable figures, save on the supposition that impure and infected milk is an essential factor in the production of abdominal tuberculosis in young children. Not all these cases, it is true, should be regarded as due to milk. The habit of expectoration by adults, the creeping habits of children, their liability to put everything into their mouth, lead to a very great possibility of infection with human tubercle bacilli through the digestive tract. But admitting this, and admitting also the wretched hygienic conditions above-mentioned, admitting even that the hygiene of the house in Great Britain has not improved at the same rate as has the hygiene of the factory and of work places in general (which

improvement is the main cause of the decrease in tuberculosis in adults in Great Britain), if mesenteric tuberculosis were in the main due to infection with human tubercle bacilli, then, with the lessening of tuberculosis in adults, there ought certainly to be a corresponding diminution in the number of cases of *Tabes mesenterica* in children, and this has not occurred.

The last adverse criticism to be applied to these figures of Thorne-Thorne, and Tatham, is that possibly they are incorrect; not that they have been wrongly drawn up, but that in the earlier portion of the forty-five years tuberculosis in children was entered under some other heading as wasting disease of one or the other order. But *tabes mesenterica* is a condition which has for long years been commonly diagnosed.

Taking into consideration all these various data I am forced to the conclusion that human beings at the age to which they are most susceptible to disease in general are distinctly susceptible to tuberculosis of bovine origin. Nay, more, I must admit that it is quite possible that cases of scrofulous, that is to say tuberculous lymphatic glands and of tuberculosis of the tonsils, may also be of this origin; and as the infection may spread from the glands of the neck to the glands of the thorax, that many cases which have apparently originated in connection with the lungs and respiratory tract are truly of alimentary origin.

Yet granting all this, it must only be the more weakly children living under bad hygienic conditions or children peculiarly susceptible who are liable to this mode of infection or those, swallowing enormous numbers of bacilli with their food, otherwise it is difficult to understand why, with bovine tuberculosis so very rife, the majority of the children in certain districts do not die from this form of disease.

Lastly, it is necessary, I think, to call attention to what appears to be a faulty argument on the part of Professor Koch. 'Hitherto,' he states, 'nobody could decide with certainty in such a case whether the tuberculosis of the intestine was of human or of animal origin, now we can diagnose them; all that is necessary is to cultivate in pure culture the tubercle bacilli found in a tubercular material, and to ascertain whether they belong to bovine tuberculosis by inoculating cattle with them.' The reasoning here appears to be not in complete harmony with the facts at our disposal. Were bovine tubercle bacilli very virulent for man, and did they lead to a very rapid development of the disease, then in such cases it is quite possible that growing in the human body, they would retain their original characteristics and would be peculiarly virulent for rabbits and guinea pigs. But frequently, as is well known, cases are of long duration, and where this is so, even if of bovine origin, the bacilli, living and multiplying in the human organism, should gradually become modified, and we should expect them to assume more and more the characters peculiar to human tubercle bacilli. They would be modified by their environment, and it is doubtful whether by this test one could surely determine the origin of the infection in every or even in the majority of cases.

I do not mean here to say that there would be absolute correspondence between the bacilli taken from all cases of tuberculosis. As a matter of fact, and as Lartigau has recently shown (*American Journal of Medical Research*, N.S., Vol. No. 1, 1901, p. 156), there is a great variation in the virulence of tubercle bacilli derived from different cases of the disease in man. He, indeed, noted one case in which from the slow development, ground glass appearance of the colonies and extreme virulence of the bacilli for guinea pigs and rabbits, he was inclined to believe that he was dealing with bacilli of bovine derivation. I do not say that cases of this nature may not be detected. I only urge that the characters of the bacillus vary according to its host and to the length of the sojourn within the human body, and so the test is liable to be an uncertain one.

3.—Summary.

In endeavouring to record as impartially as is in my power the various data we possess bearing upon this question of the intercommunicability of human and bovine tuberculosis, it may well be that, detailing many facts, some of which upon first reading seem to point in the one direction, others in a direction diametrically opposite, I have left the unfamiliar reader uncertain as to my interpretation of the same, and as it is only right that the reader should expect from me where possible definite conclusions, that he should know what are my opinions, it is fitting that I should sum up the conclusions which I regard as safely to be deduced from our present knowledge of this subject. These conclusions are :

1. Bovine tuberculosis is easily conveyed from cattle to cattle and, whether by inhalation the most common method), by the milk (in calves), by contamination of stalls and drinking water through the agency of the saliva, and nasal discharge, or by intrauterine infection (very rare), this transmission from one animal of the bovine species to another is far and away the commonest mode of infection in cattle, so common that for practical purposes all other modes may be neglected.

2. Human tuberculosis is transmissible to cattle. Pure cultures of the bacilli rarely cause infection. Mixtures of tubercle bacilli with other micro-organisms (as in sputum) appear to be more infectious. The difficulty in inducing artificial tuberculosis favours the idea that natural infection of cattle with human tubercle bacilli must be of singularly rare occurrence.

3. Certain breeds of swine appear to be fairly easily infected with both human and bovine tubercle bacilli, and when infected with the former these gain an increased virulence for guinea pigs and rabbits. But while through the use of infected milk these animals become frequently infected from cattle, conditions favouring the reverse process are rare. Thus while it may occasionally be that swine, or possibly other domestic animals, act as intermediaries in the passage of tuberculosis from human beings to cattle, the conditions favouring such transmission from man to the hog, from the hog to cattle, so rarely show themselves that, again, for practical purposes, this mode of infection may be neglected.

4. If this be so it should be possible to eradicate bovine tuberculosis in a region in which human tuberculosis continues to be widespread.

5. Human tuberculosis in the majority of cases is conveyed from human being to human being by inhalation, more rarely it is conveyed through the alimentary tract, still more rarely through the genital tract, through surface wounds, and, from the mother to the foetus, during intrauterine life.

6. Everything points to the fact that in the main the bacilli causing infection in man are derived from previous cases of the disease in man.

7. By sojourn in the human body and passage from man to man the human tubercle bacilli have acquired properties differing from those acquired by bacilli which have passed through cattle ; their shape differs, the rate of growth and the appearance of the growths outside the body are different ; their virulence towards the animals of the laboratory is also different.

8. These differences are not, however, sufficiently marked or constant enough, to permit us to conclude that we are dealing with distinct species. On the contrary the evidence at our disposal points clearly to the fact that in the different species of animals we encounter at most races of tubercle bacilli, which by growth in the bodies of animals of another species take on the characteristics of the race of bacilli peculiar to that species.

9. Bovine tuberculosis can be transmitted to man and this either through wounds or through the digestive tract.

10. By passage through cattle the tubercle bacillus gains increased virulence for cattle, rabbits and guinea pigs, but lessened virulence for man and (it would seem also) for carnivorous animals.

11. Save in the very rare cases of wound infection, there is a significant lack of evidence that bovine tubercle bacilli infect adult human beings.

12. It is infants and those of early age who are liable to be infected by the tubercle bacilli of bovine origin, and this through the agency of milk. The statistics bearing upon the continued frequency of tuberculosis in children and upon the relative frequency of intestinal and abdominal tuberculosis in children must be accepted as conclusive evidence upon this point.

13. Even with children a consideration of the great frequency of bovine tuberculosis in certain regions and of the absence of any record of tuberculosis affecting those supplied from a given 'milk-round,' leads to the conclusion that the bovine bacilli have not heightened virulence.

14. The few positive records we possess of direct transmission of tuberculosis from cattle to man through the agency of the milk indicate that infection is brought about only by the employment of milk of cattle which are very extensively diseased, more especially of those suffering from udder disease. Such milk contains enormous numbers of bacilli. In other words, large numbers of tubercle bacilli are required in order to infect human beings with bovine tuberculosis. This again is an indication that the bacilli cannot be regarded as having gained a heightened virulence for man, and that infection is not very readily communicated.

15. Animals showing physical signs of tuberculosis (for mild grades of the disease afford no physical signs), and, above all, those exhibiting udder tuberculosis, should therefore be condemned and under no conditions should their milk be used for food.

16. Where there is tuberculosis in a herd, Bang's method should be employed, the animals reacting to tuberculin being separated from the healthy ones; the milk from the reacting animals for whatever purpose used, should be pasteurised so as effectively to destroy the tubercle bacilli. (*Vide* previous report.)

17. The great cause of infantile mortality is inflammation of the stomach and intestines (gastro-enteritis and 'diarrhœa'), and this is proved to be mainly brought about by the use of badly kept and fermenting milk. Wholly apart therefore from the question of tuberculosis, it is imperatively necessary that greater care should be exercised by all concerned in the distribution of milk. The general measures taken to lessen this, the greatest scourge of childhood (prohibition of use of milk from cattle showing any form of sickness, pasteurisation of milk, &c.), will equally lessen the danger of the transmission of tuberculosis from cattle to man.

Had this been more fully realised, had the agitation (in England more especially), for municipal and governmental supervision of the milk supply and for the distribution of pure milk been based upon what we know concerning contaminated milk in general and its dangers, rather than, as it was, upon the danger arising from the conveyance of tuberculosis, it is safe to say that Koch's address would not have had nearly the same deleterious effect.

But, acknowledging this, Koch is by no means absolved from blame for the manner in which he published his conclusions. It was his duty to have pointed out that those conclusions did not affect in the slightest the legislative and other measures adapted to reduce the danger to cattle and to the agricultural community resulting from the spread of tuberculosis among cattle and the domestic animals. Not doing this he left it to be inferred that legislation against bovine tuberculosis is in excess of what is necessary. And this, it is right to protest, was little less than criminal on his part. I should be glad to think that the cautious stand I have taken during the last few years since I have had the honour to be pathologist to your department, and my constant endeavour not to exaggerate, in these reports, the dangers of bovine tuberculosis in relation to human beings, have here in Canada lessened this harmful influence of Professor Koch's address.

PICTOU CATTLE DISEASE.

In the summers of the year 1894-95, I was deputed by the Minister of Agriculture to investigate the remarkable localized enzoötic, affecting more especially cattle, occurring in the north of Nova Scotia and extending, roughly, from Pictou on the west to Antigonish on the east, known as 'Pictou Cattle Disease.' The results of my investigation were published with some little detail in the report to the minister for the year 1895. I further communicated a description of my findings to the Pathological Section of the British Medical Association, at its meeting in Montreal, in 1897, of which brief abstracts appeared in the *British Medical Journal* and the *Lancet* of that year. Owing, however, to the loss of certain notes and more especially to the difficulty I found in devising a method for demonstrating in the tissues the bacteria described by me, I have not so far published the whole results of my research, nor have I ever regarded it as being definitely concluded. Add to this that I could not feel that my discoveries adequately explained all the features of this peculiar disease.

The main disturbance in the organs occurring in this disease as shown at post-mortem, is the development of an extreme condition of cirrhosis of the liver ; that is to say, of replacement of large portions of the liver tissue by fibrous connective tissue. My findings led me to observe whether anything similar was to be made out in connection with cirrhosis of the liver in man, and since 1895 I have, when the opportunity occurred, carefully examined into the bacteriology and the microscopical appearances in connection with this latter state.

The results of my observations and those of workers in my laboratories upon the same subject have been published in a series of papers in the *Montreal Medical Journal*, the *British Medical Journal*, the *Lancet*, the *Journal of Experimental Medicine*, the *Journal of Hygiene*, &c. I have been led by these observations to study a much wider field, namely, that of the presence of bacteria in the organs of the body in general, more especially of bacteria derived from the intestines, and as these observations have materially modified my views with regard to the nature of 'Pictou Cattle Disease' it is but right that I should here briefly refer to them and note other observations which have been made more directly in connection with the disease in question.

It will, in the first place, be necessary to say a few words with regard to the leading features of 'Pictou Cattle Disease,' and this more particularly because I learn that the edition of the report to the minister for 1895 is completely exhausted. 'Pictou Cattle Disease' is only found in Canada in a district spreading along the northern coast of the Nova Scotia peninsula, in a tract of country extending about forty miles along that coast and stretching from five to twelve miles inland. In this district it has been noted for some forty years, now at one end of the area, now at the other. Cattle are in the main affected, but cases are on record in which sheep and even horses have shown similar symptoms. The disease would seem to be very chronic. All the cattle upon a farm are not affected simultaneously, but it has been generally found that in the course of three or four years most of the cattle of a given herd will one after the other be affected. It would not seem that the disease spreads directly from animal to animal for there appears to be no special incidence of the cases following upon the long winter sojourn of the animals in the byres. The gradual extension of the disease from farm to farm through any given district, seemed also to some extent to be related to the fact that each farm had at the back a belt of woodland into which the cattle roam during the summer. These belts are badly fenced off from each other, and the animals when seriously diseased are liable to wander off into the woodland and there die in hiding. This, together with the fact that one or two cases are on record in which the disease had broken out in a neighbourhood after the body of a cow affected with the disease, had been washed down one of the streams and stranded upon the farm lands, appeared to give some considerable support to the conclusion that the disease was of

infectious origin. Indeed for a time the government regulations which demanded the destruction of the diseased animal and the burning of the carcass or burying it in quicklime, seemed to have a deterrent effect upon its spread. During the first few years in which these regulations were carried out the number of cases occurring annually sank from 150 to under 30.

Of late years, since 1898, despite these regulations, the disease has become somewhat more frequent so that doubts are naturally being cast upon this theory of the infectious origin of the disease.

With regard to the symptoms, the first to be noted is that the milk acquires a peculiar bitter taste and has a distinctly acrid odour upon boiling; following upon this, within a few days, the animal becomes dry, is found to be weak and restless, the coat stares, the limbs are dragged, the bowels loose, some swelling of the abdomen is recognizable, the eyes project and are staring, and the conjunctivæ of the eyes have a slightly yellowish tinge. This weakness deepens and in general the animal dies in a condition of complete muscular weakness and exhaustion, but in some few cases the symptoms are more acute and death is preceded by a period of intense excitement, almost maniacal in character, the animal rushing about blindly charging various obstacles; after a few hours it falls into a condition of exhaustion or paralysis, followed rapidly by death.

During the two years that I conducted this investigation, I made post-mortem examinations upon some thirty animals, the majority of which I killed in the advanced stage of the disease, and I found, as Dr. Osler and Dr. Wyatt Johnston had previously noted, that the main lesion is an extreme condition of cirrhosis, the fibrous tissue not only being along the vessels between the lobules (periportal), but extending in between the individual cells, the organ being enlarged somewhat and having a smooth or, more rarely, a finely granular surface. In addition I noted the abundant production of thin bile; almost without exception the gall bladder was found very full and the fæces well stained. The lymphatic glands at the root of the liver and the abdominal lymphatic glands were in general large and succulent, and there was a moderate amount of ascites; the fluid in the abdominal cavity was particularly clear and limpid. With this there was a remarkable condition of gelatinous œdema of the mesenteries and walls of the intestines, so that these were much thickened. A further constant lesion was the presence of numerous follicular ulcers in the fourth or the true stomach. These, save in very acute cases, were found to be in a cicatrized condition, giving strongly the impression that the earliest lesions in the case were gastric and that the disturbance of the abdominal lymphatic system and in the liver were secondary to this. The spleen was large but by no means markedly so. As noted first by Dr. Wyatt Johnston, in the cases killed apparently in the early stages of the disease, the most noticeable features in the liver are the fatty degeneration of the liver cells, together with great congestion of the vessel of the liver.* This stage appears to give place to a rapid destruction of many of the liver cells and replacement of the same by delicate new connective tissue, which still remains very vascular and also contains abundant lymph channels and lymph spaces, for almost without exception abundant thin fluid made its way into a canula or pipette when this was pushed into the liver substance.

Dr. Wyatt Johnston, and I also, by employing the more usual method of trying to obtain cultures of bacteria by means of sterilized platinum needles, gained negative results, but when, instead of making the inoculations upon the spot, I employed a series of sterilized glass pipettes in which I collected relatively large amounts of the juice of the various organs, ascitic fluid, blood, &c., and then, after some hours,

* I have within the last few weeks received from Dr. Pethick a liver showing admirably this earlier stage, with great congestion and fatty degeneration, from a cow examined by him at Antigonish.

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inoculated this juice upon various media, I was able to constantly, from the lymph of the abdominal glands and from the liver juice, and more rarely from other organs and fluids, to obtain in each case growths of what seemed to be a characteristic micro-organism. These growths in general developed slowly, often not being present until the end of 48 hours at the body temperature, and in each case they showed themselves to be a small polymorphous organism at times appearing as a diplococcus, at other times as a stumpy bacillus or diplobacillus. This by its polymorphous character gave me a considerable amount of trouble until I noted that in the earlier stages of growth the diplococcus form was the more frequent, later giving place to a more bacillary form. The constancy with which I found this organism in the liver and in the abdominal lymphatic glands seemed in itself at that time to indicate very clearly that this bore some relationship to the disease, more especially when, as was most frequent, I obtained this organism from the bodies of animals which I had myself killed and examined immediately after death, in which, therefore, there was no time for post-mortem entrance of the micro-organism.

This microbe proved itself to be pathogenic for rabbits, guinea pigs and mice, the rabbits dying in some 15 to 20 days, and the guinea pigs in from 30 to 35 days, as a general rule. As I pointed out in my previous report, I was, however, unable in these inoculations to produce a condition of cirrhosis in the animals inoculated with a pure culture, and to this extent the organism did not fulfil Koch's postulates, and it was left open whether this truly had been the cause of the disease. I should add further that upon examining the sections of the liver which had been stained by particular methods, I was eventually able to recognize similar little diplococcoid bodies in abundance in the liver cells and in great abundance also in the abdominal lymphatic glands, and in the liver these were mainly within the cells. When I inoculated rabbits with the pure cultures I obtained the same intracellular appearance of minute diplococci.

From these observations it would seem clear that the development of the Pictou cattle disease is but slow and that there is extensive involvement of the liver before any of the symptoms show themselves. Our experience with the development of fibrous connective tissue in man indicates that this is a matter of weeks rather than of days.

Shortly after my return from Pictou, the first case of human cirrhosis which came to post-mortem presented a condition which resembled greatly that seen in the Pictou Cattle Disease. The fibroid change in the liver, it is true, was further advanced and the liver was small and hobnailed in appearance, but there was the same enlargement of the mesenteric and retroperitoneal lymph glands and of those at the hilus of the liver, and the same curious gelatinous œdema of the mesenteries and walls of the intestine, a change which had not previously been described in connection with this condition in man, although since then I have frequently found it present. This has led me during the last few years to study the bacteriology of human cirrhosis.

More than one form of human cirrhosis is recognized. The so-called hypertrophic biliary cirrhosis of Hanot has for long been regarded by Hanot and the French school in general as of infective origin, brought about by the inflammation of the bile ducts. But this is rare ; by far the most common form is the atrophic or portal cirrhosis, in which the new fibrous tissue is laid down primarily, it would seem, along the sheaths of the branches of the portal vein within the organ. This form most commonly occurs in those giving an alcoholic history, so that alcohol has for long been regarded as the main cause, indeed the condition has been known as the 'gin-drinker's liver.' But now those who have studied the subject are practically agreed that while alcohol may be and probably is an exciting cause, it is not the essential cause. Many cases are on record in which no alcohol has been taken and, again, feeding animals with alcohol in the great majority of cases leads to no cirrhosis,

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while thirdly, a systematic examination of the livers of confirmed drunkards, shows that cirrhosis is the exception rather than the rule ; the fatty liver is the common alcoholic condition.

On the other hand, there are definite indications of infective or bacillary disturbances in connection with cirrhosis. The ascites which is so common in this condition is often not pure, but shows evidence of a combined inflammatory disturbance with the development of adhesions and very frequently evidences of inflammation around the liver with adhesions to the diaphragm, while in quite a large proportion of cases we obtain a history of a right sided pleurisy which points to an extension of the inflammation through the diaphragm to the overlying pleura.

In this very first case, above mentioned, studied by me, I obtained evidences of bacteria similar to those of Pictou Cattle Disease, but owing to the fewness of cases presenting, to the great difficulty of staining sections aright, and, I must add, to my own failure to recognize the true relationships of the forms I isolated, it was not until 1898 that I published upon the subject, first in the *Montreal Medical Journal*, in July of that year, and next in a paper read for me by Professor Osler at the Edinburgh meeting of the British Medical Association (*The Lancet*, Aug. 13, 1898, p. 376) announcing the existence of a micro-organism in associations with progressive portal cirrhosis similar to that found by me in connection with Pictou cattle disease. This organism I obtained from the liver juice, the ascitic fluid, the lymph from the mesentery, heart blood, kidney and mesenteric glands.

The colonies at first were very minute and the organism, with its pronounced polymorphism and tendency to change from the diplococcoid to the stumpy bacillary form, closely resembled that seen in the Pictou Cattle Disease. Examining a series of sections of twenty cirrhotic livers, I found these present in the liver cells as minute diplococcus-like bodies, surrounded by a faint halo, so small as best to be studied under a very high power of the microscope, namely, under 1-18th or 1-20th immersion lens. Here the 'diplococcoids' in general had a brown stain. But, as I pointed out in the paper contributed to the *British Medical Journal* (October 22, 1898), further studies threw a very considerable light upon this remarkable form. They showed conclusively that both the form obtained from the Pictou cattle disease (as, indeed, had been suggested by Professor Boyce in the discussion upon my paper in Montreal, 1897) and that from the human livers, were at most varieties of the colon bacillus, of the organism, that is to say, which is the common inhabitant of the lower intestinal tract in man and the majority of the warm-blooded animals. They were obviously attenuated and grew more slowly than the typical colon bacillus, they did not cause the same rapid turbidity of broth, while culture outside the body rendered them more active in their growth until eventually they closely corresponded in size and in most of their properties with the group of colon bacilli. Their effects when inoculated into rabbits and guinea pigs, resembled also those seen in connection with the colon bacillus.

I may here add that Dr. Charlton, now Fellow in Pathology at McGill University, has within the last year studied the organism of Pictou cattle disease, which we have kept growing for some years in our laboratory, and finds that it corresponds in all particulars with a form of colon bacillus ('Bacillus D') described by Dr. W. W. Ford, in his study of the varieties of colon bacilli isolated from man (*Montreal Medical Journal*, November, 1900.) This form was isolated by Dr. Ford from the spleen of a case of typhoid in man. This, or the Pictou Cattle Disease organism, has, briefly, the following characters : It is a stumpy bacillus, having a diameter less than 1 μ , motile, having lateral flagella, forming no scum when grown on broth, and causing slight turbidity of that medium. Growths upon agar are smooth and glistening, not very abundant ; growth upon potato visible and luxuriant (in the early stages the growth upon this medium was but slight) ; it grows in the closed end of Smith's fermentation tube and best at the body temperature ; it can grow in the absence

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of free oxygen ; causes no liquefaction of either gelatin, casein or blood serum ; it produces gas when grown in dextrose and lactose broth, but not with saccharose (originally it did not ferment either dextrose or glucose) ; there is no production of nitrites, but indol is present (originally no indol was present) ; milk is turned acid and eventually coagulated, and there is a slight fæcal odour ; no production of pigment upon agar and no fluorescence (originally many of the cultures obtained direct from the cattle showed a distinct tendency towards the production of a slight yellow colour). It grows best in media which are faintly acid, and is non-pathogenic for mice (the early cultures showed themselves distinctly pathogenic for mice, and this I regarded as one of the indications that I was not dealing with the colon bacillus).

It is interesting to note that parallel with this, Dr. Charlton studied the colon bacillus obtained from the stomach of a case of pernicious anæmia in man, and this gave identical reactions.

It is thus clear, on the one hand, that the organism of the Pictou Cattle Disease is one of a very large group of colon bacilli, and this alone throws some little doubt upon whether it should be regarded as the specific micro-organism of that disease ; because, while colon bacilli have pathogenic properties, and in fact set up many forms of disease in man, the morbid conditions induced by them are all more generalized and not so specialized a type as that possessed by this disease. But from another point of view, if we are not to regard this as the specific organism of the disease, we are, I think, bound to regard it as playing some part in the development. For, on the one hand, as pointed out by Dr. Wyatt Johnston and Mr. E. W. Hammond, the blood of cattle affected with this disease agglutinates the micro-organism isolated from their livers, and this agglutination test is in general regarded as an indication of such relationship between microbe and disease ; and, secondly, these micro-organisms are present in such abundance in the liver and mesenteric lymphatic glands, and that so, constantly that they cannot be regarded as meaningless.

As pointed out in my paper of October 22, 1899, yet further study showed me that in a great number of livers having no symptoms of cirrhosis, similar minute diplococcoid forms are to be recognized in the cells (although not in such great numbers), while, again, as I pointed out at full length in a paper upon the diplococcoid form of the colon bacillus (Adami, Abbott and Nicholson, Transactions of the Association of American Physicians, 1899, and Journal of Experimental Medicine, 1899, vol. 3), by inoculating pure cultures of typical colon bacilli into the veins of a rabbit, after a few hours one gets similar appearances.

These observations led me further to study the bacteriology of apparently normal healthy organs, and as I pointed out in my address to the Society of Internal Medicine at Chicago, in December, 1899 (Journal American Medical Association, Dec., 1899), we are bound to conclude that under ordinary conditions there is a constant passage of bacteria into the organs, and that these bacteria, while, again, as I pointed out at full length in a paper upon the diplococcoid forms staining badly, and often having a brownish tinge, present in the abdominal lymphatic glands and in the liver, are an indication of the constant destruction of these bacteria in these organs. Since then the very remarkable paper of Dr. Ford, late Fellow in Pathology, McGill University (Transactions of the Association of American Physicians, vol. xv., 1900, p. 389, and Journal of Hygiene, vol. 1, 1901, p. 277), has carried on these researches further, and has shown that in at least 80 per cent of the livers and kidneys of healthy normal animals, bacteria are to be obtained which are capable of development, provided the proper culture media be adopted, and provided that these organs be cultivated for a sufficiently long time after their removal from the animals used.

How now do these observations bear upon Pictou Cattle Disease and upon ordinary portal cirrhosis in man ? As I pointed out in my paper in the *British Medical Journal*, of October, 1898 'It may be argued that inasmuch as such forms are con-

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stantly to be found in the liver, it is clear that the bacillus can have no power to induce excessive active tissue formation, or otherwise, every living being should suffer from cirrhosis. But there is this to be noticed, that in the ordinary liver in which cirrhosis is absent, the forms visible are almost all corpses and even long action of strong carbolised fuchsin will not lead them to become stained. In cirrhosis on the other hand, while there are many of these non-staining forms, areas can be made out in which diplococcus-like bodies stain deeply. Either they have only recently entered the organ and are just killed, or they are still alive though in a form so attenuated that it is only with difficulty that cultures can be grown from the organ. I still cannot but consider that the very great number of these forms found in well-marked advancing cases of cirrhosis is ample evidence that there is a direct relation between them and the process. So also in those advancing cases of cirrhosis my observations show me that the mesenteric glands are crowded with the diplococcus form of the bacillus, just as I found them crowded in cases of Pictou Cattle Disease.'

That certain forms of the colon bacillus under certain conditions are able to bring about cirrhotic changes, has been shown by Dr. Weaver of Chicago (*Philadelphia Medical Journal*, February 4, 1899). He obtained the colon bacillus which he worked with from the body of a female guinea pig. Guinea pigs inoculated with a small amount of the culture, if they did not die within twenty hours, lived from eight to twenty days, and in these animals dying at later periods there was an extensive and early cirrhosis of the liver. Unfortunately after a short period these bacteria lost their virulence so that further transference of cultures and study of the development of cirrhosis could not be made.

These observations, so far as they go, are in favour of believing that the organisms of the colon group, play a definite part in the production of cirrhosis.

I further suggested (in the paper just referred to) that in ordinary human cirrhosis we have almost always a history of subacute enteritis or gastro-enteritis, set up apparently by alcohol or some other irritant, and that this inflammation of the bowel by leading to the greater passage out of leucocytes and passage back of these leucocytes containing bacteria, sets up a condition of increased invasion of the organism, more especially by the colon bacillus, the normal inhabitant of the intestine, and I referred to Ramond's observations (*La Presse Medicale*, April 21, 1897), in which he obtained cirrhosis by giving animals by the mouth alternating doses of alcohol and bacterial toxines.

Now, it is interesting to note that a constant lesion in Pictou Cattle Disease is the evidence of ulceration of the 4th stomach. Here it seems to me is the indication of a similar primary gastritis or gastro-enteritis. According to this theory therefore, the colon bacillus or modified form of the same, which I have detected in these cases, is not necessarily the prime cause of the disease, but there is a preliminary and primary inflammation of the intestinal tract. This may be brought about by the colon bacillus but is more likely to be induced by some other cause, either bacterial or toxic, and it still remains to be discovered what is this primary cause.

During this last summer on his return to New Zealand, Mr. J. A. Gilruth, Chief Veterinary Officer and Bacteriologist to the Agricultural Department of New Zealand, in passing through Montreal, called upon me and brought to my attention the fact that in New Zealand they have encountered a very similar disease affecting horses and cattle. Since then he has been good enough to forward to me the reports of his department dealing with this subject. I may here give an epitome of his observations (5th report of the Department of Agriculture of New Zealand, 1897, p. 35) :

The disease appeared in the Winton district, in Southland, fourteen years previously, and has not been observed in any other part of the colony. While there has been considerable loss of horses it showed little or no tendency to spread from farm to farm. No particular age or breed was found more susceptible, although the affected animals were mostly aged ; the season appeared to be without influence though possi-

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bly spring and autumn were the periods during which the majority of cases were found. Cases observed by Mr. Gilruth showed jaundiced appearance of the mucous membrane of the mouth, eyes and nostrils; want of co-ordination of the muscles of the limbs, with staggering gait; staring condition of the pupils; constipation and general drowsiness. At times the animals would walk straight through an obstruction. In all cases the liver was more or less involved and apparently cirrhotic. Judging from his description the course of the disease is of longer duration than is that of Pictou Cattle Disease.

On microscopical examination the liver showed a variety of conditions, but in the early stage the capsule was normal, the tissue of the gland soft; vessels greatly distended with blood, and atrophy of the liver cells; thrombi were often encountered in the hepatic veins and a certain amount of pigment was present in the organ. In the later stages the liver is smaller and harder than normal, presenting in one case all the naked eye appearances of the cirrhotic or hobnailed liver. Mr. Gilruth noted also, which was not observed in cattle, namely, appearances of abundant liver cells within the vessels of the liver and other regions.

It is worth while noting that he found that one-half grain dose of strychnine given in powders, one daily, appeared to have a distinct effect in arresting the course of the disease while purgatives aggravated the symptoms. In this report Mr. Gilruth calls attention to the constipation, and suggests that owing to the want of tone of the intestinal walls, the retained food, fermenting, leads to the abundant production of toxic substances which being, in their turn, absorbed, cause the symptoms of intoxication, &c.

In his report for 1898-99, are given illustrations showing the close resemblance of the liver disturbance to those seen in our Pictou Cattle Disease. In this second report Mr. Gilruth modifies his opinion that the intense congestion was the primary condition in the liver, and regards this as secondary to the cirrhotic change.

In this report he gives a case of a farmer who had lost several cows under peculiar conditions with similar symptoms in each case. This also occurred in Southland where the Ragwort is very prevalent, and to this the owner attributed the disease. I infer from a paragraph in the report for 1898, p. 41, that the Ragwort (*Senecio Jacobæa*) had also been regarded in the district as the cause of the Winton Horse Disease, and that this weed is common in other parts of Southland, New Zealand, without causing any disturbance, hence he denies its relationship. The conditions here were similar to those seen in our cases. Micro-photographs given of a section of the liver might have been taken also from a case of Pictou Cattle Disease. On this farm mentioned, the government biologist, Mr. T. W. Kirk, had the previous year reported the existence of no poisonous or even harmful plant, but Mr. Gilruth found that in addition to the *Senecio Jacobæa* to which apparently he attached no importance, the cows had been in a native bush close to the paddock, and that they were all in the habit of stripping the leaves from the trees which were being felled there.

It is, to say the least, interesting that in Nova Scotia the popular view has been to attribute Pictou Cattle Disease to the existence of the Ragwort. For myself, I continue to be most doubtful as to whether any such relationship exists, although, believing in the existence of some primary cause, not necessarily microbic, I should be glad to find that the irritation caused by the Ragwort was of this nature. Nevertheless, the negative results of the experiments conducted under this department years ago by Dr. Wm. McEachran (when animals were fed for long periods upon dried ragwort), would seem strongly to negative this supposition.

My conclusions may be summed up thus: While it is possible that, as suggested by Dr. Weaver's observations, cirrhosis of the liver may be directly caused by one or other of the colon bacillus group, I am inclined to favour the opinion that there is a primary inflammation of certain portions of the alimentary tract set up by some other irritant, and that it is this primary inflammation which favours the extensive invasion of the blood and lymphatic vessels of the abdominal area, by bacteria mainly belong-

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ing to the croup of colon bacilli, which bacilli, by their direct presence in the lymphatic glands and in the liver and by their toxines, set up those cellular disturbances which result in the production of the peculiar anatomical changes found in the Pictou Cattle Disease and in progressive portal cirrhosis in man.

I have the honour to be, sir,

Your obedient servant,

J. GEORGE ADAMI,

The Honourable
The Minister of Agriculture,
Ottawa.

No. 16.

REPORT OF THE ASSISTANT PATHOLOGIST.

(CHARLES H. HIGGINS, B.S., D.V.S.)

MONTREAL, October 31, 1901.

SIR,—I have the honour to submit this my report upon the investigations carried on at the Outremont Experiment Station, from November 1, 1899, to October 31, 1901.

These investigations were seriously interfered with, owing to my transference to the Pacific Quarantine Station at William Head, in March, 1900, for the purpose of establishing at that point, a bacteriological laboratory for the manufacture of Haffkine's prophylactic preventive to bubonic plague, which disease at that time threatened the Pacific coast.* My duties at this station covered a period of nine months, seriously interfering with the work I had in hand before leaving for the west.

However, in spite of the difficulties against which it has been necessary to conduct this work, some of our experiments have been fruitful, while others had to be given up incompleated owing to my absence.

STERILITY OF TUBERCULIN.

In view of the fact that statements were made by opponents of tuberculin testing, that tuberculin contained living germs of tuberculosis and was liable to produce tuberculosis in the animals upon which it was used, a request was made that I inoculate sufficient guinea pigs with the product received from the following laboratories : —Koch's, as used by the department ; United States Bureau of Animal Industry ; Parke Davis and Company, and that prepared by Mr. Ross, of Guelph, Ontario.

With each of these four samples three guinea pigs were inoculated. The day previous to the inoculation their temperature was taken at intervals of two hours, to determine the normal, they receiving the tuberculin in the evening. The day following the temperatures were also taken every two hours to determine whether or not the animals which were being used were diseased to commence with. In no case

* A special report of the work at this station appears in connection with Dr. Montizambert's report in the appendix to the report of the Minister of Agriculture for the year 1900.

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was there a reaction ; but in every instance where the same tuberculin was used upon animals known to be diseased a definite and characteristic reaction resulted.

The guinea pigs were weighed daily, the increase in weight being similar to the increase noted in other animals of the same age and under similar conditions, excepting that these latter received no tuberculin.

The amount of tuberculin used was as nearly identical as it was possible to obtain in every case. It was diluted with sterile water and one five-hundredth part of the cattle dose used.

The animals were retained for a period of six weeks, at which time they were chloroformed, careful autopsies being made. The liver and lungs of each animal were examined and in no instance was there evidence of tubercular lesions.

The results of this series of experiments gives conclusive evidence of the non-infectiousness of the samples of tuberculin received for experimentation.

One who is at all familiar with the manner of preparation of this product, would not question the sterility of the 'regular' tuberculin as used for diagnostic purposes on cattle, as the heat to which it is subjected is sufficient to kill any living germ of tuberculosis.

CELLOIDIN CAPSULES.*

In the experimentation with these capsules the aim was to determine what changes, if any, cultures of human tuberculosis would undergo, provided they were inserted beneath the skin or in the various body cavities of the lower animals. With these capsules in the living animal conditions are obtained which cannot be reproduced under artificial conditions, namely, that of subjecting the experimental material to the action of the body fluids which pass through the celloidin of the capsule, together with the constant body temperature.

A culture of the bacilli of human tuberculosis was used in each case. Capsules were inserted in pigeons, fowls, rabbits, a heifer and a dog. These insertions were made just prior to my transference to the quarantine station in British Columbia, and during my absence the pigeons died from natural causes. When removed from the other animals, the capsules had remained in these artificial containers for a period of very nearly a year. Those in the fowls revealed nothing, the whole of the infection having died out. The one in the dog revealed no evidence of tubercular matter when examined microscopically. The two capsules from the rabbits revealed nothing of particular interest. Polymorphous forms were present, retaining the dye when stained by the Ziehl-Neilsen method. Sub-cultures made direct from the capsules failed to grow. No animal inoculations were made from this series of capsules.

The heifer used in these capsule experiments presented an interesting autopsy, for at the time of insertion of the capsule, one was broken in the process and a slight tuberculosis established in the vicinity. The capsule finally inserted was allowed to fall into the peritoneal cavity as was the original intention. Very briefly, the autopsy on this animal, which was killed on March 4, 1901, a year from the time of insertion is as follows : The capsule was firmly imbedded in the connective tissue beneath the peritoneum in the right flank. A few small tubercles were present, in all probability caused by the breaking of a capsule at the time of insertion. There were but seven of these tubercles noted and none was larger than a pea.

In this capsule polymorphous forms were detected which stained with fuchsin, and, like tubercle bacilli, were not decolourized by the ordinary methods used in tubercle staining. I was unable to get growths, although all media generally used were tried under varying conditions, together with many forms of special brain media,

* *Vide* McCrae Journal of Experimental Medicine, Oct., 1901.

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which have proven more successful in the growth of tubercle bacilli than those ordinarily used. Three guinea pigs were inoculated from the celloidin capsule subcutaneously in the flank region. None of the three developed tuberculosis, indicating that the infection had died out during the prolonged stay of the capsules in the bovine system.

It is desirable to conduct other experiments along these lines, for it seems that if they were properly conducted, definite facts could be obtained, which would determine the relationship between germs of human and bovine origin.

IMMUNITY TO TUBERCULIN BY REPEATED TESTS.

These experiments extend over a period of two years, and they are very interesting, as they are repeated tests upon two tuberculous animals which were at the station in June, 1899. The accompanying table, in which is to be found a record of the various tests and their reactions or failures to react, give one a good idea of the uncertainty of repeated testing, whether it be within a very short or longer period.

By looking over the tests of Cow I., it will be seen that in her reactions there was a marked uncertainty, and that on a test held after some months we were not certain of a definite reaction, while one held almost immediately in the case of Cow V. did give a reaction.

Tests 3 and 4 were the result of an endeavour to produce a localized artificial tuberculosis in the udder that we might obtain infected milk. In the case of Cow I., which was inoculated with a preparation of bovine origin, we were successful in getting germs in the milk, and establishing at the point of inoculation an extensive localized infection, as will be seen by reference to the record of the autopsy on this animal. With Cow V., the experiment was conducted with germs of human origin, having apparently no effect save that of a tuberculin reaction, due to the toxine injected with the bacilli.

An unexplainable fact is that these animals had reacted to tests, one on October 30, 1900, and another on January 3, 1901, but failed to react on April 16, after an interval of three months from the last test. The tuberculin used in this last test was prepared by myself, and did give a reaction in the case of two heifers used for cohabitation, on the same date, which on post-mortem were found to have definite foci of tubercular infection. These facts indicate that the tuberculin was not at fault.

I will not further dilate upon these experiments with tuberculin, for the chart is self-explanatory.

The record of these animals is as follows :—

Cow No. I.—A grade animal, about eleven years old. In good condition, not giving milk, having been dry for about three months. On arrival at Outremont she reacted to tuberculin. She was inoculated on August 3, 1899, with three cubic centimetres of a preparation of pure bovine tubercle bacilli. The inoculation was made into the udder, giving on the day following a definite tuberculin reaction (test 3 on chart). This reaction was obviously due to the tuberculin (*i.e.*, the products of growth of the tubercle bacilli) contained in the preparation together with the bacilli. Guinea pigs inoculated with this culture died in fourteen and fifteen days respectively. A tumour-like mass formed at the point of inoculation which fluctuated considerably in size from time to time.

Autopsy held April 17, 1901.—The superficial glands of the flank and shoulder were free from evidence of disease. The post pharyngeal glands revealed no lesions. The anterior mediastinal glands were slightly affected, containing a very few small tubercles. The brachial glands were slightly affected. Lungs free from evidence of disease.

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Liver presented a few small tubercles.

Spleen and kidney free from lesions.

Some few of the mesenteric glands were found slightly affected.

There was evidence of the progress of the disease being arrested temporarily and new tubercles forming, but in no instance was there calcification of the tubercular masses. In the lymph glands especially was this arrested process noted.

The udder was extensively diseased, together with the lymph glands at its base, although one of these lymph glands showed no lesions. The localization of the disease in the immediate vicinity of the site of inoculation is very interesting. The lesions consisted of large tubercular abscesses filled with creamy pus. The milk of this animal after the inoculation in the udder presented tubercle bacilli continually, and this milk produced tuberculosis in guinea pigs inoculated with it.

Cow No. V.—Grade cow, about eight years old, in good condition, but reacting to tuberculin. She was inoculated into the udder on September 26, 1899, with a pure culture of *human* tubercle bacilli, which preparation killed guinea pigs in eighteen and twenty-three days respectively. After the inoculation there was a definite tuberculin reaction (test four on the chart).

On June 24, 1899, two heifers were placed one on either side of the animal, each being found infected after a period of 107 days and revealing lesions of tuberculosis on post-mortem. On March 15, 1900, a second pair were placed one on either side. Of this pair one reacted to tuberculin in nine months and the other in thirteen months.

Autopsy April 17, 1901.—The superficial glands of the flank and shoulder were free from evidence of tuberculosis. The post pharyngeal glands were healthy. The mediastinal glands were affected in but one instance and this was a small tubercle about the size of a pea. The brachial glands contained a few small tubercles. Spleen free from evidence of disease. The liver presented a few small tubercles of recent origin. Kidney free from lesions. The mesenteric glands were affected in a few instances.

Lungs.—The right lung was found to be diseased as diagnosed in June, 1899, and contained a few tubercles about the size of a hen's egg, which did not seem to be in an active stage. In portions adjacent were to be seen some very small miliary tubercles but these were not extensive. The lesions did not seem in any way to communicate with the bronchial tubes as they must have done when heifers placed with her contracted the disease.

Wherever lesions of old standing occurred it appeared that, while they had not undergone calcification and true encysting, they had been rendered inactive, the contents being different in character from that seen in active suppurating lesions. This would seem to be borne out by the fact that for quite a period the animal failed to respond to tests, while a slight rise in temperature was obtained January 3rd, 1901.

In the udder no lesions were detected after a careful microscopic search, *i.e.*, the inoculation of human tubercle bacilli had led to no results.

TABLE 1.

TUBERCULIN TESTS.

Number.	Designation of Animal.	Date of Test.	Time of Injection.	Temperature before injection.	TEMPERATURE AFTER INJECTION.										Reaction in Degrees.	Remarks.	
					6 a.m.	8 a.m.	9 a.m.	10 a.m.	Noon.	2 p.m.	3 p.m.	4 p.m.	6 p.m.	8 p.m.			
1	Cow I.....	June 20-21, '99	6 p.m.	102	102	104	104	104	106.6	104	103.4	102.6	2.0	Inoculated with pure culture of bovine preparation.
2	" V.....	" 20-21, '99	6 p.m.	101.6	102.4	104	..	104	104	106.6	....	104.8	....	103.8	103	3.2
3	" I.....	Aug. 3, 1899.	4.30 p.m.	101.2	....	....	....	....	....	....	....	104	....	103.4	102.4	5.4
4	" V.....	Sept. 26, 1899.	5.30 p.m.	102	102.4	101.3	105	106	105.3	105.3	105.3	4	Inoculated with pure culture of human tuberculosis preparation.
5	" I.....	Jan. 11, 1900.	6 p.m.	101.1	106.1	105.2	....	105.2	103	102	....	....	102	101.3	....	5
6	" V.....	" 11, 1900.	6 p.m.	100.1	104.3	105.1	....	106	105	105	....	....	103.1	102.3	....	5.4
7	" I.....	" 16, 1900.	6 p.m.	101	101.1	101.3	..	101.3	101.3	101.2	....	....	101	101	....	Double dose used.
8	" V.....	" 16, 1900.	6 p.m.	101.1	102.2	102.2	102	102.1	103	102	101.4		1.4
9	" I.....	April 17, 1900.	6 p.m.	101	102	102	102	102.4	103	102.3	102.1		2
10	" V.....	" 17, 1900.	6 p.m.	100.3	102.4	103.1	103.1	104.3	104	103.1	102	4	Double dose used.
11	" I.....	" 20, 1900.	6 p.m.	102	101.2	101.4	....	101.4	101.1	102.3	....	....	102	102.3	....	....
12	" V.....	" 20, 1900.	6 p.m.	101.3	102.3	102	....	101.3	102	102	....	....	102	101.1	....	....
13	" I.....	June 1, 1900.	6 p.m.	101.1	102	102.1	....	101.4	101.4	102	....	....	102	101.1	....	Special tuberculin.
14	" V.....	" 1, 1900.	6 p.m.	101.3	101.4	102	101.3	101.3	102	101.3	101.1
15	" I.....	Oct. 30, 1900.	6 p.m.	101	103.2	103	103.2	104.3	104	103.1	103		3.3
16	" V.....	" 30, 1900.	6 p.m.	101.2	101	101.1	....	101.1	103	102.4	....	....	103	102.1	....	1.3
17	" I.....	Jan. 3, 1901.	6 p.m.	101	104.1	104	....	102.1	102	102	....	....	102	101	....	3.1
18	" V.....	" 3, 1901.	6 p.m.	101	104	104	....	102.4	102.3	102.3	....	....	102.2	101	....	3
19	" I.....	April 16, 1901.	6 p.m.	102	101.2	101.1	....	101	101	....	....	....	....	....	....	Special tuberculin.
20	" V.....	" 16, 1901.	6 p.m.	101.2	102	102	101.2	101.1		"
21	Heifer 6.....	June 1, 1900.	6 p.m.	101.1	102	102.1	101.4	101.4	102	102	101.1
22	" 6.....	Jan. 3, 1901.	6 p.m.	101.2	103.3	103.1	....	103.1	102.4	102	....	....	101	101.1	....	2.1
23	" 21.....	" 3, 1901.	6 p.m.	102	101.3	102	....	102.4	102	101.3	....	....	102.4	101.3	....	....
24	" 6.....	April 16, 1901.	6 p.m.	102	105	105	....	104.1	105.1	103.4	....	....	103.4	....	....	3.1
25	" 21.....	" 16, 1901.	6 p.m.	102	104	105.1	....	103.4	103.3	102.3	....	....	102.3	....	....	3.1

Tests 9 to 16 and 21 were made through the kindness of Dr. Moore during my absence.

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COHABITATION.

The cohabitation experiments in a previous report gave definite results with cow V., and it was desired to repeat them, using the same animal to supply the infective material. The two heifers, subjects for this experiment, were placed one on either side of this cow on March 15, 1900, and remained for a considerable period before becoming diseased, as will be seen by referring to the chart of the tuberculin tests. The fact that the animal with which these two heifers were cohabited was the subject of repeated testing, and that at the autopsy evidence was found indicating the arresting of the disease for periods as shown by the lesions, would lead one to the conclusion that the animal was not constantly infective. The non-infectiveness of this animal is further borne out by the length of time taken in infecting the heifers. It must be remembered, however, that the conditions under which the animals were kept were excellent, there being at all times plenty of fresh air and sunlight in the stall within which they were confined. These sanitary arrangements were almost ideal, rendering infection much more difficult than would be the case in a poorly lighted and ill ventilated stable, hence the danger of allowing an infected animal to remain with those known to be healthy becomes very evident.

At the autopsy in each heifer, the lesions were very slight. In the case of heifer 6, which was placed on the right side of the cow, the post pharyngeal glands, together with those of the mediastinum were slightly affected.

In the case of heifer 21, on the left side of the experimental cow, small caseating abscesses were present in the post-pharyngeal glands, other organs and glands being normal.

CULTURE MEDIA.

Since my return my attention has been directed particularly to the study of brain media for the growth of tuberculosis. The results, so far, have been promising, and will be reported at a later date.

TYPHOID BACILLI.

Their Detection in a Sample of Water taken from the Tanks of the ss. 'Montezuma.'

On February 8, 1900, I received from Dr. Montizambert, Director General of Public Health, a sample of water taken from the tanks of the ss. *Montezuma*, on which vessel a number of cases of typhoid had occurred, with the request that it be determined whether or not bacilli of this disease were present.

In pursuing the investigations upon this water, the methods more commonly known, namely, those of Hiss and Capaldi, were tried a number of times without success. Growths were obtained, but a positive diagnosis was not obtained following the methods of these workers.

Fortunately a new method, or rather the modification of an old method by Hankin*, came to hand, resulting in the isolation of the bacillus typhosus.

This method of Hankin is very simple, consisting of the inoculation of a series of tubes containing ten cubic centimetres of broth, to which Parietti's solution has been added in successive amounts, one, two, three, &c., drops to a tube. After inoculating with the suspected material, the tubes are incubated, and on the day following the procedure is repeated, using the tube next below that which shows the smallest amount of growth. In the second series, Parietti's solution is added in the same manner, commencing with the number of drops as contained in the tube used to inoculate from.

* Centralblatt für Bakteriologie, 1900.

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Three or four days of this procedure will eliminate the more rapid-growing putrefactive bacteria, and cultures should be made upon plain agar tubes, which in this work are preferable to plates. From the broth cultures selected, it is well to make about one hundred agar cultures, which are examined on the following day after being incubated. Tubes which show no colonies resembling typhoid are at once discarded. Tubes showing colonies similar to typhoid, are taken and cultures made from the typhoid-like colonies upon lactose-litmus agar. Any of these cultures on lactose-litmus agar, which show a reddening of the medium after being incubated for two days, are thrown aside as of no further value. Those which still remain blue are retained and fermentation tubes inoculated. If no gas is introduced, the Widal typhoid reaction is tried, and if the characteristic clumping is obtained, it proves the presence of the typhoid bacillus.

This, then, is very briefly the method of Hankin. I was very fortunate in succeeding upon the first trial in isolating this germ where the Hiss and Capaldi methods had failed to reveal its presence.

The success one meets with in using this process is not so much a matter of technique as it is of having an unlimited supply of culture media on hand with which to proceed.

In connection with this examination, a control containing typhoid was carried in order to check the results obtained from the suspected matter.

This is the simplest and most efficient method I have yet tried for isolating this germ, which is always so closely associated with bacillus coli.

ANTHRAX.

Acting on instructions received September 2 from Dr. D. McEachran, Chief Inspector of Live Stock, I left for the North-west to assist Dr. Hargrave in stamping out and controlling an outbreak of anthrax occurring in the sheep belonging to the Canadian Land and Ranch Company at Swift Current, arriving at the ranch on the 6th, where I was met by Dr. Hargrave.

At the time of my arrival the outbreak had been stopped by moving the sheep progressively off the infected area. Microscopic examinations were made of various dead animals in which the diagnosis of anthrax was confirmed, and in addition to this microscopic examination, 'gophers' were inoculated with the earth from around carcasses, dying inside of twenty-four hours of anthrax.

The inconvenience caused by not being able to get vaccine with which to start the inoculation of the sheep was great, as it was desired that they all be inoculated before weaning the lambs and their removal to their winter quarters.

The vaccine when it did come, came in small lots, necessitating great delays, for it was necessary to do a band consisting of two thousand at a time, it not being possible or practicable to divide the flocks.

The result of the vaccinating was not wholly satisfactory owing to the great number of deaths occasioned by the use of vaccine supplied to us. Following is the report of Dr. Hargrave and myself upon the result of the use of the vaccine on the sheep.

SWIFT CURRENT, ASSA., N.W.T., October 2, 1901.

SIR,—We have the honour to submit the following report concerning the vaccination of sheep, the property of the Canadian Land and Ranch Company at their ranch at Swift Current, Assiniboia, N.W.T.

With one lot of vaccine sent us there have been vaccinated 4,673 sheep, including fat sheep and yearlings. Since vaccinating the number of deaths has been 475.

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Three thousand eight hundred and one ewes and lambs have been vaccinated with first lymph supplied from the same source, but owing to the excessive death rate in those receiving both lymphs it was not considered advisable to apply the second lymph.

With Pasteur's vaccine 4,000 ewes and lambs have received both lymphs.

The other vaccine has impressed us as being carelessly prepared, evidence of putrefactive change being present in many of the vials. The amount of undiluted material varied in both lymphs from one to four cubic centimeteres in vials that were measured.

Pasteur's vaccine has in every instance appeared uniform in colour and consistency, and without odour save that natural to the bacillus anthracis.

The sheep vaccinated with the first supply of vaccine have after the application of the first lymph, presented an enlargement at the side of inoculation varying in size from a pea to a pigeon's egg. No inflammatory change was noted in any case after Pasteur's first lymph.

Dr. Hargrave will supply further detailed report of the deaths among all the vaccinated sheep, which report is at present incomplete, sufficient time not having elapsed since the use of Pasteur's second lymph to determine its effects.

We have the honour to be, sir, your obedient servant,

(Signed) J. C. HARGRAVE,

Inspector.

"

CHAS. H. HIGGINS,

Assistant Pathologist.

Dr. D. McEACHIRAN,

Chief Inspector of Stock,
Montreal, Que.

At the time of the original outbreak the disease was contracted by the manager of this ranch, Mr. Alexander, and one of the shepherds, but in neither instance did it prove fatal having been promptly treated.

MICROSCOPIC EXAMINATIONS.

This refers to the work for diagnosis upon specimens sent in by inspectors in the event of an outbreak of a contagious disease. It is not necessary to dilate upon these reports, as a report of the outbreak provided the examination revealed the infective agent is to be found in connection with that of the inspector reporting the outbreak of disease.

TUBERCULIN TESTING.

In connection with my regular experimental work I have tested 105 head of thoroughbred cattle, most of which were for export to the United States, and in this number have had 17 reactions, which reacting animals have been placed in quarantine.

I have the honour to be, sir,

Your obedient servant,

CHAS. H. HIGGINS,

Assistant Pathologist.

To the Honourable

The Minister of Agriculture,
Ottawa.

No. 17.

CATTLE QUARANTINE.

(M. C. BAKER, D.V.S.)

MONTREAL, October 31, 1901.

SIR,—I beg to report that during the year ending October 31, 1901, I have inspected and passed for shipment from the port of Montreal, at the Canadian Pacific Railway Company's stockyards of this city, 45,619 head of cattle and 13,616 sheep. Of these 5,386 head of cattle and 896 sheep were from the United States.

The monthly inspections, which have been already forwarded to the department, are as follows :—

	Head of Cattle.	Sheep.
November 1900.	7,019	2,451
May, 1901	2,834	336
June, 1901	4,004	1,900
July, 1901	5,214	2,736
August, 1901.	9,273	2,173
September, 1901	11,138	1,161
October, 1901	6,137	2,859
Total	45,619	13,616

The number of cattle shipped from this port in October is much less than in the same month of last year. This is owing to the fact that during the month there were shipped via Boston and Portland nearly 5,000 head of cattle from Canadian Pacific Railway stockyards.

Of the cattle inspected at the Canadian Pacific Railway stockyards and included in the above list, 783 head were shipped from Quebec, the balance from Montreal.

During the year there were rejected 36 head of cattle and 3 sheep. Of these animals rejected only one was affected with actinomycosis, the balance were injured or lame. The cattle and sheep that have been inspected demonstrate that the Dominion is remarkably free from disease.

Acting on instructions received from the department, I visited the county of Welland, Ontario, to investigate a reported outbreak of rabies, but was unable to determine if the animals that were supposed to have died of rabies or had been killed on account of having been suspected of having the disease really had rabies. I reported fully at the time of making the investigation. The inoculations made by Dr. Higgins from portions of the brain of the animal on which I made a post-mortem examination, did not give any definite results.

As there have been no further cases reported, we must conclude that if the suspected animals really had rabies, all that became inoculated either died or were killed.

I have the honour to be, sir,
Your obedient servant,
M. C. BAKER, D.V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

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No. 18.

CATTLE QUARANTINE.

(CHARLES McEACHRAN, D.V.S.)

MONTREAL, October 31, 1901.

SIR,—I have the honour to report that during the year commencing November 1, 1900, and ending October 31, 1901, 1,160 horses have been inspected by me, and exported from the port of Montreal to Great Britain. Forty-four horses were held back on account of being slightly affected by a contagious and infectious disease, viz., 23 from influenza and 21 from strangles.

I have the honour to be, sir,

Your obedient servant,

CHARLES McEACHRAN,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 19.

CATTLE QUARANTINE.

(B. A. SUGDEN, D.V.S.)

MONTREAL, October 31, 1901.

SIR,—I beg to report that during the period extending from November 1, 1900, to October 31, 1901, there were inspected and passed for shipment at the Grand Trunk Railway stock yards, Montreal, 34,914 cattle, of which 3,043 were from the United States, and 32,959 sheep, of which 15,914 were from the United States.

The shipments were distributed as follows :—

	Canadian Cattle.	United States Cattle.	Canadian Sheep.	United States Sheep.
November, 1900	2,233	34	1,787	.....
May, 1901.....	7,533	1,218	171	7,947
June, 1901	7,147	391	1,247	4,872
July, 1901.....	4,971	238	3,718	2,864
August, 1901	3,712	322	3,651	231
September, 1901.....	2,618	234	2,929	.....
October, 1901.....	3,657	696	3,542	.....
	31,871	3,043	17,045	15,914
		31,871		17,045
	Total cattle.	34,914	Total sheep.	32,959

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There were rejected 27 head of cattle, four of which were cows apparently suffering from tubercular lesions of the udder, the balance being held back for injuries.

Thirty-four sheep were rejected for lameness and injuries received during transportation.

I have the honour to be, sir,
Your obedient servant,

B. A. SUGDEN, D.V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 20.

CATTLE QUARANTINE.

(A. E. MOORE, D.V.S.)

MONTREAL, October 31, 1901.

SIR,—I have the honour to submit the following report of work done by me during the past year from November 1, 1900, to October 31, 1901.

TUBERCULOSIS.

I beg to report that I have tested 680 head of cattle for tuberculosis during the past year, 123 were tuberculous and 5 suspicious. Of this number 115 were tested for export to the United States for breeding purposes. Eighteen of these reacted and are in quarantine on the premises of the owners.

I inspected the beef of 47 of these tuberculous animals, 19 were fit for food, the others either had generalized tuberculosis or were too thin for food. One herd of 17 dairy cows were too thin for beef, but the owner insisted on killing them immediately, as he did not wish to incur expense of getting them into condition for beef.

All the other cattle that reacted are still alive and in quarantine on the owner's premises.

Ninety-two of the above diseased animals were from three herds, viz., 57 tuberculous out of a herd of 72, 18 out of a herd of 21, and 17 out of a herd of 20. This is an interesting instance in that it shows the great importance of good ventilation. These stables were all kept fairly clean and dry, but there was little or no provision made for ventilation, there being far too little breathing space for each animal, for example, the stable having 20 cows was 30 feet long by 20 feet wide, and 6 feet high, only three escaped the disease and 2 of these stood nearest the door which was not very tightly closed.

In another stable the temperature was generally kept at 65 to 70 degrees F. in the winter (from the heat of the animals), the building being kept tightly closed up, consequently about 80 per cent of a very large herd became tuberculous. These animals all contracted the disease within two years, having been tested two years previously and found healthy. The source of infection was a cow with generalized tuberculosis, having a profuse discharge from the uterus, which was a mass of disease.

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ANTHRAX.

Fifty-six cattle and two horses have died from anthrax in districts investigated by me during the year, 35 cattle in Ontario, 18 cattle and 2 horses in Quebec, 3 cattle in New Brunswick. I have vaccinated 75 herds, numbering 887 cattle with the Pasteur anthrax vaccine. The results have been very satisfactory, no deaths having been reported from those that have been vaccinated, and many of these animals were allowed to graze on the contaminated pastures, after inoculation.

In the neighbourhood of Oznabruck, Lunenburg and Newington (Cornwall and Stormont Counties, Ontario), there were about 30 deaths in cattle from anthrax. The disease was somewhat scattered but was confined to farms along the course of a creek. The neighbours were very much alarmed and anxious to have their herds vaccinated. Over 1,000 cattle were vaccinated in this district by Dr. Higginson and myself.

BLACK LEG.

Fourteen deaths confined to three farms have occurred from black leg on farms where I have investigated on instructions from the department. These carcasses were burned; the surviving young cattle on each farm I vaccinated with Pasteur cord vaccine.

GLANDERS.

Four horses belonging to Mr. L. P. Cramer, of Windsor Mills, P.Q., reacted to the mallein test. They were destroyed at the owner's request. His premises have been renovated and carefully disinfected, and I have tested with mallein his two other horses which were exposed for a short time, and found them free from the disease.

Mr. Cramer himself contracted the disease, which shows the danger of contact with glandered horses.

I have the honour to be, sir,
Your obedient servant,

A. E. MOORE, D.V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 21.

REPORT ON POINT LEVIS CATTLE QUARANTINE STATION.

(J. A. COUTURE, D.V.S.)

QUEBEC, P.Q., October 31, 1901.

SIR,—I have the honour to forward my report, for the last twelve months, of live stock imported into this quarantine.

During that period we have received 390 cattle, 1,108 sheep, 63 pigs, a total of 1,561 animals.

CATTLE.

The cattle were of the following breeds :—266 Shorthorns, 50 Polled Angus, 30 Simmenthalers (Swiss), 21 Galloways, 13 Ayrshires, 10 Guerneseys.

Their destinations were as follows :—

	For Canada.	For U. States.
Shorthorns	219	47
Polled Angus.. . . .	...	50
Simmenthalers.. . . .	...	30
Galloways	7	14
Ayrshires	13	..
Guerneseys	10	..
	<hr/>	<hr/>
Total	249	141

There were born in quarantine 7 calves. Two calves died.
Twelve cattle were tested with tuberculin.

SHEEP.

The sheep were of the following breeds :—466 Rambouillets, 293 Shropshires, 131 Lincolns, 90 Cotswolds, 49 Oxfords, 37 Hampshires, 22 South Downs, 20 Dorsets.

Their destinations were as follows :—

	For Canada.	For U. States.
Rambouillets.. . . .	68	398
Shropshires.. . . .	174	119
Lincolns.. . . .	...	131
Cotswolds	85	5
Oxfords.. . . .	12	37
Hampshires.... .	6	31
South Downs	17	5
Dorsets	19	1
	<hr/>	<hr/>
Total.. . . .	381	727

PLAN OF PTE. LEVIS LIVE STOCK QUARANTINE

28 Cattle

FORT N° 3

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PIGS.

The pigs imported were as follows :—57 Yorkshires, 4 Large Blacks, 3 Tamworths, 2 Berkshires, a total of 63.

All were for Canada, except 5 Yorkshires.

I am glad to report that there was no contagious disease during the past twelve months among animals arriving at this quarantine.

I have the honour to be, sir,

Your obedient servant,

J. A. COUTURE,

Inspector.

The Honourable

The Minister of Agriculture,
Ottawa.

No. 22.

REPORT ON ST. JOHN CATTLE QUARANTINE STATION.

(J. H. FRINK, D.V.S.)

ST. JOHN, N.B., October 31, 1901.

SIR,—I have the honour to submit annual report of work at this station. The total export of live stock to Great Britain from this port numbered 25,681, made up as follows :—

Canadian cattle.. . . .	8,546
Canadian sheep	6,727
United States cattle.. . . .	3,289
United States sheep	6,892
United States horses.. . . .	17
Canadian horses.. . . .	210
Cattle condemned	2
Sheep condemned	1
Horses condemned.. . . .	1
Detained and reshipped	2
Killed in transit.. . . .	22

These animals were all inspected, and no contagious disease was found in them. One horse condemned with pneumonia, one bull with foot foul, and a steer with acute bronchitis, were sent to the abattoir. One United States sheep badly affected with foul in the foot was sent the same way. Twenty-two animals were killed or injured sufficiently in transit to necessitate their destruction. Deaths and injury were most noticeable in shipments of sheep. Very great improvements have been made by the Canadian Pacific Railway at St. John West, in regard to the accommodation of live stock for export. A large area has been covered with suitable stables, with excellent facilities for food and water, capable of containing at least 1,200 head of stock. These yards and stables have been placed within a hundred feet of the face of the docks, and will prove of great convenience to cattle-carrying ships. With existing facilities, shippers may forward their cattle days before loading, and have them obtain rest and food before being placed on shipboard. This work has been accomplished none too soon. The imports of stock from abroad have been light, and consisted of six stallions imported by Col. Dent for improvement of stock, thirteen

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thoroughbred cattle from Great Britain, which were detained ninety days in quarantine, and one cattle and eleven swine for breeding purposes from the United States.

No export of cattle has been made to the United States from this province during the year. A few years ago a very large number of high grade milch cattle were taken up by United States buyers. This trade has been discontinued, as our farmers, more readily than ever, realize the advantage of keeping this class of cattle in the country.

One animal was tested for tubercle prior to export to West Indies, belonging to Mr. James Friars, Shediac, N.B., and passed satisfactorily.

There is no contagious disease of animals in this province, except tuberculosis and actinomycosis.

I have the honour to be, sir,
Your obedient servant,
JAMES H. FRINK,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 23.

REPORT ON HALIFAX CATTLE QUARANTINE STATION.

(WM. JAKEMAN, D.V.S.)

HALIFAX, N.S., October 31, 1901.

SIR,—I beg leave to submit the following statements of animals inspected during the twelve months, ended October 31, 1901.

EXPORTED.

Horses.. . . .	83
Mules.. . . .	—
Cattle.. . . .	301
Sheep.. . . .	1,098
Swine.. . . .	9

IMPORTED.

Horses.. . . .	11
Mules.. . . .	—
Cattle.. . . .	1
Sheep.. . . .	—
Swine.. . . .	—

In addition to these 200 cattle *ex ss. Martello* from United States, arrived with propeller broken, were placed in quarantine while repairs were being made.

I have the honour to be, sir,
Your obedient servant,
WM. JAKEMAN, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

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No. 24.

REPORT ON HEALTH OF LIVE STOCK IN ONTARIO.

(ANDREW SMITH, F.R.C.V.S.)

TORONTO, October 31, 1901.

SIR,—I have the honour to make the following report on the health of the domestic animals in the province of Ontario during the past year.

HORSES.

No special outbreak of disease in this province. But influenza and strangles—both in rather a mild form have occurred to a greater or less extent, more especially in cities and crowded localities, with very few fatal results from either disease, I believe. Horses generally in good health. Two cases of glanders were reported by Mr. Armstrong, V.S., of Sparta, both were destroyed.

CATTLE.

Some cases of anthrax were reported in the neighbourhood of Millbrook. Investigation proved that a few cases that were believed to be anthrax had occurred in that locality, but that the disease had not spread much amongst the herds on the farms on which it had appeared, and that it had not been communicated from farm to farm, the farms on which it had occurred being widely apart. Some other cases of the disease have been reported. But it does not appear to have spread to any extent.

A large number of cattle are brought into the Toronto cattle market. These are mostly fat cattle in prime condition for butchering. Any of these that present any indications of disease are held to be butchered under veterinary inspection, and only a very few have been condemned as unfit for food, as the result of the post-mortem examinations. The cattle brought in are, as a rule, good grades in prime condition and healthy. Throughout this district cattle are generally healthy.

SHEEP.

Generally healthy—Mr. Gerrow, V.S., of Woodville, reports some cases of scab near Dalrymple, P.O.

SWINE.

Generally healthy—No outbreaks of contagious disease in this locality. But outbreaks have occurred in the districts of Windsor, Wallaceburg and Chatham, which have been reported to the department.

I have the honour to be, sir,

Your obedient servant,

ANDREW SMITH, *F.R.C.V.S.*

The Honourable
The Minister of Agriculture,
Ottawa.

No. 25.

REPORT ON POINT EDWARD CATTLE QUARANTINE STATION.

(ARTHUR BROWN, D.V.S.)

SARNIA, October 31, 1901.

SIR,—I have the honour to submit my annual report of cattle and swine received into the Ontario cattle quarantine at Point Edward for the year ending October 31, 1901.

The swine imported were of good quality, a preference being shown for White Chesters.

There have been no diseased animals in the quarantine this year, and I may state that no contagious disease exists in this district, with the exception of some cattle with tuberculosis and actinomycosis.

There have been two outbreaks of hog cholera during the past year in my district, but, owing to proper cleansing and disinfection of the premises, and the destruction of diseased animals and animals that were in contact with those diseased, I hope that it has been stamped out.

Attached you will find a statement including animals received into quarantine, animals that were imported by settlers, and cattle imported for breeding purposes, that did not require to be placed in quarantine.

I have the honour to be, sir,
Your obedient servant,
ARTHUR BROWN, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

STATEMENT of animals imported at Point Edward during the twelve months ended
October 31, 1901.

Cattle	18
Sheep—	
Rams	2
For Toronto Exhibition	13
Swine	7

Also, eighteen cattle and 255 sheep returned from the Fat Stock Exhibition, Chicago.

ARTHUR BROWN, V.S.,
Inspector.

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No. 26.

REPORT OF S. E. BOULTER, V.S., INSPECTOR AT NIAGARA FALLS, ONT.

NIAGARA FALLS SOUTH, ONT., October 31, 1901.

SIR,—I beg to submit a short summary of work done by me in the interests of the department in the Niagara district during the year ending October 31, 1901.

Two cases of hog cholera have been reported to me during the year by Dr. Whybra, of Stevensville, both cases being in the township of Bertie. On investigation, I found the cases were not cholera, as reported. And it is very gratifying to be able to report that there have been no cases of hog cholera in this district during the past year. One case of anthrax was reported from Crowland township, two animals having died on one farm. The cases were undoubtedly symptomatic anthrax. The remainder of the animals were removed to higher-lying lands, and no others were affected.

Rabies was reported to be existing in the township of South Pelham, as the result of a dog bite, and I believe one mare and one cow died, showing unmistakable symptoms of rabies in the furious form. Six animals died in the same neighbourhood, and all about the same time, from a form of paralysis commencing usually in one hind leg and gradually affecting all the extremities; then cerebral disturbance became manifest, and death closed the scene in from three to five days after the first symptoms appeared. These cases have not been clear to me, as to the exact cause of the disease, and until I receive the report of the bacteriologist, I shall report it as rabies in the dumb form.

The district throughout has been very free from contagious diseases. During the past twelve months I have inspected four cattle, three sheep and thirteen swine imported from the United States.

I have the honour to be, sir,

Your obedient servant,

S. E. BOULTER, V.S.,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 27.

REPORT ON INSPECTION WORK IN PRINCE EDWARD ISLAND.

(W. H. PETHICK, V.S.)

BEDEQUE, P.E.I., October 31, 1901.

SIR,—I have the honour to furnish you with my annual report, and am glad to be able to say that the health of live stock on Prince Edward Island continues good. No outbreak of contagious disease having occurred. I have, however, been called to visit the following places to investigate the reported existence of contagious disease : Cavandish, Rose Valley, Cape Traverse (on three occasions), Darnley, Kinkora, Middleton, Clifton, Searletown, Bridgetown, Wilmot, Graham Road, South Shore, Tryon, French River and Newton. I endeavoured to attend to all such cases brought under my notice and made diligent inquiry in order to enable me to ascertain the nature of the disease, but am glad to say that in no instance did I find evidence to confirm the report or justify quarantine.

You will be pleased to notice by the charts which have from time to time reached you, that no animal has reacted to the tuberculine test. A number of breeding animals examined by me under the United States regulations were healthy, as were all incoming cattle examined in accordance with out provincial Quarantine Act. My absence during a portion of the summer will explain the limited number of shipments of live stock examined by me previous to departure for foreign ports. Mr. A. Leckie, M.R.C.V.S., of Charlottetown, acting in my place.

I have the honour to be, sir,
Your obedient servant,

W. H. PETHICK, V.S.

The Honourable
The Minister of Agriculture,
Ottawa.

Statement of animals inspected by W. H. Pethick, V.S., previous to shipment by sea from the port of Summerside during the twelve months, ended October 31, 1901.

Horses....	11
Cattle....	264
Sheep..	186
Swine..	9

W. H. PETHICK, V.S.,
Inspector.

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No. 28.

REPORT OF VETERINARY INSPECTOR AT WINNIPEG, MAN.

(CHAS. LITTLE, V.S.)

WINNIPEG, MAN., October 31, 1901.

SIR,—I have the honour to report to you the result of inspections made by me at this post for the year beginning on the 1st day of November, 1900, and ending this 31st day of October, 1901. This report includes the number of animals I have tested for tuberculosis in the city dairies. Also the number tested to go to the States.

The following animals belonging to immigrants were inspected :—704 horses, 4 mules, 900 cattle, 114 sheep and 89 hogs.

In addition to the above, I inspected two thousand one hundred and twenty-five (2,125) head of horses and mules that were brought in for sale, and for circus, racing and exhibition purposes being a total of :

Horses and mules.. . . .	2,829
Cattle.. . . .	900
Sheep.. . . .	114
Hogs.. . . .	89

I also tested 51 head of dairy cattle, 9 of which were diseased and placed in quarantine.

I have tested 41 head of pure bred animals for export to the States, one of which was diseased and placed in quarantine. I also gave certificates for 1,100 head of stockers for export south.

I was called upon to investigate one outbreak of black leg in which five animals died. I disposed of 200 doses of Pasteur's black leg vaccine cord to parties wishing to vaccinate their animals. The vaccine was sent to me by your department.

I have the honour to be, sir,

Your obedient servant,

CHAS. LITTLE, V.S.

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

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No. 29.

REPORT OF THE NORTH-WEST MOUNTED POLICE COMMISSIONER.

(A. BOWEN PERRY.)

REGINA, October 31, 1901.

SIR,—I have the honour to forward my annual report of work performed by the North-west Mounted Police for your department during the twelve months ended October 31, 1901, together with the annual reports of the following veterinary inspectors, giving in detail the various duties performed by them :

Inspector Burnett, V.S., Macleod.

Staff Sergt. Fraser, Macleod.

“ Farr, V.S., Coutts.

“ Hobbs, V.S., Calgary.

R. Riddell, V.S., Calgary.

Staff Sergt. Sweetapple, V.S., Fort Saskatchewan.

“ Mountford, V.S., Prince Albert.

“ Mitchell, V.S., Regina.

“ Ayre, Regina.

“ Matthews, V.S., Regina.

“ Coristine, V.S., Maple Creek.

“ Tracey, V.S., Battleford.

J. Hargrave, V.S., Medicine Hat.

The general health of horned stock throughout the Territories has been good, and there has been no serious outbreak amongst them of any contagious disease.

Mange, which it was feared might be prevalent during the winter months, fortunately was less common than in former years, and with the advent of spring and green grass, nearly disappeared. There has been no outbreak of anthrax, but isolated cases have appeared in different parts of the Territories.

Actinomycosis appeared in all parts of the Territories, but I think less than in former years, certainly so amongst the range cattle. There have been a few cases of tuberculosis reported, principally amongst imported stock.

HORSES.

Horses have suffered much from typhoid fever during the past year, chiefly in the Prince Albert and Edmonton districts, though some cases were reported from Medicine Hat.

Glanders is, I regret to say, still a great deal more prevalent than is desirable, but every effort is being made to stamp it out, and the number of horses destroyed during the past year is less than during the preceding year.

About 47,167 head of fat cattle were inspected for export, out of which a few were found diseased and rejected.

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The following table shows shipping points and number of cattle shipped :—

Regina and district	6,120
Qu'Appelle	2,045
Maple Creek	5,899
Rush Lake	699
Lethbridge	4,639
Macleod	1,386
Pincher Creek	606
Calgary	14,842
Medicine Hat	5,600
Claresholme	1,430
Cayley	145
Moosomin and district	3,756
Total	47,167

Cattle shipped from Prince Albert, Saskatchewan and Dundurn would bring the total number to over 50,000.

Every precaution has been taken not to delay shippers, but as there will often be several shipments in one district at widely different points, assistance has sometimes to be called in to aid our permanent staff.

Two thousand nine hundred and forty-two cattle were inspected at North Portal, the property of settlers, and 2,984 horses were inspected at the same point ; at Maple Creek, 103 cattle and 555 horses ; at Coutts, 3,980 cattle, 1,492 horses and 11,486 sheep.

Eight thousand five hundred and sixty sheep were imported at Maple Creek, and 41,565 were imported south of Cardston, just at the end of October.

A total of \$2,081.39 has been collected as inspection fees at different ports of entry, not including amount collected on sheep imported south of Cardston, and refunded to your department.

CATTLE.

Actinomycosis is generally distributed throughout the Territories, but is yearly decreasing. A marked decrease in the number of cases amongst range cattle is most noticeable, due, in a great measure, to the prompt action of stockmen who, whenever an animal is found suffering from this disease, shoot it, and either burn or bury the head. This disease was most prevalent in the Prince Albert district, thirty-six cases being reported from there. Forty-five cattle suffering from this disease were destroyed during the past year in the Territories.

Anthrax.—There has been no outbreak of this disease, but cases have occurred here and there throughout the Territories. One outbreak was reported at Carstairs, but on investigation no anthrax germs were discovered in the specimen forwarded to the pathologist at Montreal. Dr. Hargrave gives it as his opinion that symptomatic anthrax was the cause of death. After inoculation with blacklegine, no further deaths occurred.

Mange.—During the winter of 1900-1901, mange was more or less prevalent throughout the range country, but not to a serious extent. Cattle affected were taken up and treated by their owners, and with the advent of warm weather and green grass, the disease apparently disappeared. Some member of the force attended all the large round-ups, and the number of cattle reported as suffering from mange was extremely small, as the following shows :—

Calgary District, 1,850 head ; no mange.
Mosquito Creek, 8,000 head ; one case.

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Cochrane Ranch, 7,800 head ; no mange.

Pincher Creek, number not given ; no mange.

Oxley Ranch, 15,000 head ; five cases.

Circle Ranch, number not given ; three cases.

Cypress Hills, number not given ; no mange.

This is a very satisfactory showing, but it remains to be seen what effect a long and severe winter may have in reproducing this disease. At present there are cases of mange in the Sheep Creek and High River districts. Material has been shipped to the owners of the affected animals to treat them under the supervision of our inspector at Calgary. The disease also exists in certain sections of the Cypress Hills, but to a small extent.

SHEEP.

Anthrax.—This disease occurred near Swift Current, amongst sheep owned by the Canadian Land and Ranch Company. Dr. Hargrave, V.S., of Medicine Hat, was in special charge during the continuance of the outbreak. Prompt measures were taken at once to isolate the infected district and to prevent any stock from being driven across or entering on the quarantined area, and all carcasses were burned without delay, and in a short time the outbreak was under control. The outbreak commenced in the beginning of August, and up to the 26th of the same month, some 2,500 sheep died. On September 7, Dr. Hargrave, V.S., and Dr. Higgins, of Montreal, began to vaccinate the sheep, using two different kinds of vaccine, considerable loss resulting from the use of one kind, a full account of which is given in Dr. Hargrave's report. This band at the end of the year appeared to be quite healthy. The range they had been using was to have been burned over, but snow coming early prevented this. The state veterinarian of Montana wrote in some alarm about this outbreak, fearing that the disease might be carried across the line by birds or antelope, and it was reported in Montana that large numbers of antelope had mysteriously died on Canadian territory, but after careful inquiry I am convinced that there is no truth in this statement.

The Montana authorities were written to and told that every precaution had been taken to prevent the spread of the disease.

Foot rot was reported amongst a band of sheep at Wood Mountain, but on examination there were found to be but few cases. The cause was running the sheep on wet ground, and on their being driven to higher and dry ground, the disease soon disappeared.

Scab.—None has been reported.

HORSES.

Glanders.—This disease is still much too common, and cases have occurred all over the Territories, the greatest number, perhaps, being in Eastern Assiniboia. People are fully alive to the dangers of this dread disease, and report promptly any suspicious symptoms in their horses, and a great deal of the veterinary inspectors' time is taken up in examining and testing suspicious cases. Col. Dent complained of glanders appearing in horses purchased by him in the Maple Creek and Medicine Hat districts. An order was sent to the officer commanding that district, to have his quarantine inspectors examine all horses in the Cypress Hills. This work was commenced, but as the horses were scattered over an immense tract of country, and most of them quite unbroken, it was found quite impossible to make a thorough examination, unless there was a general round-up of all the horses. Your department was consulted on this point, and the matter is now under consideration.

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I believe it is the intention of the department to issue a pamphlet for distribution on 'Glanders,' and this will supply a long felt want.

Ninety horses were destroyed during the year, distributed as follows :—

Macleod and Lethbridge district	1
Maple Creek district.. .. .	45
Calgary district.. .. .	5
Prince Albert district	6
Fort Saskatchewan district.. .. .	6
Regina and district.. .. .	27
<hr/>	
Total	90

Typhoid fever has been common as usual in the northern districts ; very little seems to be known of the cause and nature of this disease, and there is much to learn. One prime cause appears to be the drinking of polluted water, a large amount of stock being watered from sloughs in close proximity to drainage from the barn-yards. Dirty and ill ventilated stables is likely another cause. The disease is very fatal and even if the horse recovers, in most instances he is a physical wreck and quite unfitted for any work.

Strangles has been accountable for the death of quite a number of horses during the past year.

Equine Syphilis.—Strict injunctions were issued to all veterinary inspectors to make a thorough examination of all stallions and mares imported from the States. No cases of this disease were reported.

GENERAL REMARKS.

Dr. Hargrave, V.S., of Medicine Hat was appointed to test cattle for breeding and dairy purposes for export west of Moosejaw and Dr. Charles Little, V.S., of Winnipeg, east of Moosejaw.

Blackleg vaccine was supplied by your department and sold at cost price to stock men for the inoculation of young stock. The total quantity disposed of by the police was 575 doses. The intention of the government to do this was widely circulated and quite a few ranchers took advantage of it, and next season I am certain a large quantity of vaccine will be required to meet increased demands. I know only of one case where a calf that had been vaccinated died.

Authority was granted allowing settlers coming in from the United States with small bands of sheep which were free from disease, but for which no health certificate was held, to be passed and to proceed to their destination.

There promises to be a large importation of sheep from Montana next year into the country from about south of Swift Current to the mountains. Special instructions have already been received to have a most careful examination made, particularly for scab, of all imported sheep and these instructions will be rigidly carried out. There is some friction now between cattle and sheep men in the Cypress Hills, and is always likely to be when cattle and sheep are present on the same range, and I would strongly recommend that the portions of country set apart for sheep grazing be made public, and that the sheep be not allowed to graze outside these limits.

There is one subject that demands attention and that is the importation of a worthless class of horses by half-breeds and Indians. They go south of the line and acquire a certain number of ponies which they smuggle into the Territories.

Apart from these being an undesirable class of animal they are not inspected by any veterinary surgeon, and as a consequence glanders or other infectious or contagious diseases can be introduced.

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During the past year several seizures of such stock have been made, and in every case the owners have been allowed to regain possession of their horses on paying duty and expenses.

In one case where the horses had been brought in by half-breeds some had actually been sold, still they were allowed to pay the duty and go scot free. Until more severe measures are taken Indians and half-breeds will continue to smuggle in horses and take chances of being caught. If they are caught it means just paying duty and if not caught they are that much ahead.

I have the honour to be, sir,
Your obedient servant,
A. BOWEN PERRY,
Commissioner, N.W.M.P.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 30.

REPORT OF VETERINARY INSPECTOR AT NELSON, B.C.

(J. A. ARMSTRONG, V.S.)

NELSON, B.C., October 31, 1901.

SIR,—I have the honour to submit to you this my report for the year ending October 31. I beg to say that this country has been very free from disease, there being only one outbreak during the year, viz., glanders in the stable of Warden Brothers, three horses having to be killed.

The following is a statement of the stock imported into this district during the year :—

Horses.. . . .	294
Mules.. . . .	4
Cattle.. . . .	89
Sheep.. . . .	7,614
Swine.... .	10

I have the honour to be, sir,
Your obedient servant,
J. A. ARMSTRONG, V.S.,
Inspector.

The Honourable.
The Minister of Agriculture,
Ottawa.

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No. 31.

REPORT OF VETERINARY INSPECTOR AT GRAND FORKS, B.C.

(S. C. RICHARDS, V.S.)

GRAND FORKS, B.C., October 1, 1901.

SIR,—I have the honour to submit my annual report of animals imported into the Kettle River district for the year ending October 31, 1901.

Total number of animals inspected : Horses, 193 ; cattle, 45 ; hogs, 43 ; sheep, 487 ; mules, 1.

It is my pleasure to state that the condition of all the cattle in the district is good, and that glanders has been successfully stamped out.

I have the honour to be, sir,

Your obedient servant,

S. C. RICHARDS, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 32.

REPORT OF VETERINARY INSPECTOR AT VANCOUVER, B.C.

(J. B. HART, V.S.)

VANCOUVER, B.C., October 31, 1901.

SIR,—I have the honour to report this district as being comparatively free from contagious disease.

There is still a percentage of tuberculosis and actinomycosis ; but the tuberculin test is becoming more popular with breeders and shippers as they learn of its practical infallibility, and I trust a few years of watchful care will see bovine tuberculosis practically weeded out.

Sheep scab and foot rot are heard of, but not seen. I investigated a reported case of the latter, but it proved nothing more serious than softened tissue on the flock being moved from dry, hard, hill pasture to soft wet bottom land.

Symptomatic anthrax or blackleg exists in certain sections. But the mortality is being largely diminished by the preventive, blacklegine or blackleg vaccine, furnished at a nominal figure by the Dominion government. Of the animals examined and tested for export to the United States, I have had to refuse certificates for and condemn seven head.

I have the honour to be, sir,

Your obedient servant,

J. B. HART, D.V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 33.

REPORT OF VETERINARY INSPECTOR AT VICTORIA, B.C.

(S. F. TOLMIE, V.S.)

VICTORIA, B.C., October 31, 1901.

SIR,—I have the honour to submit to you a report of the animals inspected at Victoria during the year ending October 31, 1901.

Appended you will find a statement of the number of animals inspected.

I have detained animals in quarantine for the required periods, whenever necessary, in accordance with the regulations.

The health of animals in this district generally has been good, and I have found no cause to condemn any during the year.

I have applied the tuberculin test to twenty-two cattle without rejecting any.

The horses imported were nearly all of the driving and general purpose class ; there were a few thoroughbreds.

The cattle were all dairy animals.

The sheep were principally stock sheep of medium quality, and some good pure-bred rams.

The farmers of this district are showing an increased interest in the improvement of their herds and flocks, and have patronized the government sales of live stock liberally.

This cannot fail to have a very beneficial effect on the quality of the stock.

I have the honour to be, sir,

Your obedient servant,

S. F. TOLMIE, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

STATEMENT of animals inspected at Victoria, B.C., during the twelve months ended October 31, 1901.

	Imported.	Exported.
Horses and mules.. . . .	216	2
Cattle	37	4
Sheep.. . . .	319	9
Swine.. . . .	1	..

S. F. TOLMIE, V.S.,
Inspector.

No. 34.

REPORT ON PICTOU CATTLE DISEASE IN NOVA SCOTIA.

(GEO. TOWNSEND, V.S.)

NEW GLASGOW, N.S., October 31, 1901.

SIR,—I have the honour to submit herewith a statement showing the number of cattle slaughtered for ‘Pictou Cattle Disease,’ and amount of compensation paid therefor during the year ended October 31, 1901.

I have the honour to be, sir,
Your obedient servant,

GEORGE TOWNSEND, V.S.,

STATEMENT of cattle slaughtered and amounts paid, from November 1, 1900, to October 31, 1901.

Month.	Number slaughtered.	Amount paid.	Month.	Number slaughtered.	Amount paid.
		\$ cts.			\$ cts.
November	8	57 00	Brought forward....	24	171 33
December	4	20 00	May	12	90 00
January	2	13 33	June	20	155 00
February	1	5 00	July	18	148 33
March	4	31 00	August	9	84 00
April	5	45 00	September....	4	35 00
			October	5	40 00
Carried forward....	24	171 33	Total	92	723 66

GEORGE TOWNSEND, V.S.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 35.

REPORT ON LIVE STOCK CARS AND YARDS.

(M. AUGER.)

OTTAWA, October 31, 1901.

SIR,—I have the honour to submit to you my annual report covering the period from November 1, 1900, to October 31, 1901.

I am pleased to say that there has been some improvement in the cleaning of local live stock cars. Although there have been cases of neglect, which it is almost impossible to prevent, the different railroad companies handling live stock have shown a disposition to do what is right.

The live stock cars carrying cattle to and from the United States are duly cleaned and disinfected, and very few had to be returned for not being cleaned according to regulations.

During the year I had several cattle yards put in good order.

In compliance with your request in March last I visited the west as far as Victoria, B.C. I saw several officers of the Canadian Pacific Railway and the result was that several yards were put in proper condition.

I had intended returning there this fall, as it was rather early when I went, but have not yet been able to go.

About the middle of October, I visited, at your request, the cattle yards and sheds at West St. John, or Carleton, N.B. I found the Canadian Pacific Railway Company had covered their sheds, enlarged them and built others sufficient to cover over a thousand head of cattle at a time; they were then dividing the different buildings, making stalls and putting in water tanks. The said works were expected to be completed in three weeks from that time, October 9, 1901.

I have the honour to be, sir,

Your obedient servant,

M. AUGER,

Inspector of Live Stock Cars and Yards.

The Honourable
The Minister of Agriculture,
Ottawa.

SESSIONAL PAPER No. 15

No. 36.

REPORT ON THE TESTING OF CATTLE FOR TUBERCULOSIS IN GREAT BRITAIN DURING THE SEASON OF 1901.

GLASGOW, SCOTLAND, October 31, 1901.

SIR,—I beg to lay before you a brief report of the work performed by me as veterinary quarantine officer of your department, stationed during the past season in Great Britain.

Acting upon your instructions, I proceeded to England, arriving at Liverpool on April 8. On April 10, I presented your letters at the office of the High Commissioner in London, and after consultation with Lord Strathcona and Mr. Colmer, I decided to establish my headquarters in Glasgow, as very few cattle are shipped to Canada from any other British port. While in London at this time I called on Mr. Cope, F.R.C.V.S., chief veterinary officer of the Board of Agriculture, who, as did also his principal assistant, Dr. James McCall, expressed great interest in my mission, and gave me very much valuable information as to the conditions prevailing in Great Britain with reference to diseases of live stock.

I also visited Dr. T. A. Geddes, the special inspector representing the United States Bureau of Animal Industry, whose office is at the American Consulate in London. Dr. Geddes, having then been in Britain for some months, was able to give me many valuable hints as to the work before me. After making the necessary arrangements with the office of the High Commissioner, I proceeded to Glasgow, where Mr. Murray, the Canadian government agent, kindly gave me the use of part of his office, and then, as throughout the whole season, did everything in his power to assist me in the performance of my duties.

During April and May very few cattle were shipped to Canada, and I took advantage of the time thus placed at my disposal to inspect the lairages at Yorkhill, where the Canadian and American cattle are landed, as also to visit the corporation slaughter houses, with the object of acquiring some information as to the system of meat inspection carried on there.

In June, however, the export of cattle to Canada began in earnest, and has continued, practically without intermission, up to the present date. The last shipment will leave this port for Quebec to-morrow, November 1. During this period, my time was fully occupied in making the necessary tuberculin tests, the work being rendered most laborious by the fact that, while cattle are generally purchased in small lots, sellers, as a rule, absolutely refuse to have their animals tested anywhere save in their own stables.

As an instance of the way in which this condition works out, I may mention that on one occasion I found it necessary to occupy over three weeks, including Sundays, and to travel upwards of 2,500 miles, in testing thirty-four animals, twenty-six only of which were finally shipped.

When several buyers are at work at the same time, all anxious to ship at the earliest possible date, the pressure on the officer becomes very severe. Especially is this the case when a large proportion of the animals tested fail to pass, as this necessitates further testing in order to fill the gaps thus created. On several occasions, I found it absolutely impossible to get the work done, so as to avoid greatly inconveniencing buyers, without availing myself of your permission to employ assistance. When, however, it was at all possible to test the cattle personally, I spared no effort to do so. Much valuable time was spent in travelling, as small lots of cattle for the

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same buyer were frequently situated long distances apart. Personally, I tested between April 24 and October 27, fifty-three lots of cattle, comprising 397 head. Mr. Wm. Marshall, M.R.C.V.S., of Aberdeen, tested for me twelve lots, comprising seventy-six head, and Mr. Wm. Bower, F.R.C.V.S., of East Rudham, Norfolk, tested one small lot of two cattle. Of these, all but five lots, aggregating sixty head, were tested between July 3 and October 27. July, August and October are by far the busiest months, and it is practically impossible for one man to do the work during this period without subjecting shippers to very serious inconvenience, while not enough cattle are exported during the rest of the year to furnish him anything like reasonable employment. Twelve of the animals tested by me were destined for direct shipment to United States ports, while Dr. Geddes also tested a few for shipment to Canada. On two lots sent to the United States via Quebec, we divided the work fairly evenly.

I regret to say that I found a good deal of prejudice against the tuberculin test among the breeders and owners of cattle in Great Britain. In some cases, this was due solely to lack of knowledge in regard to the matter, while in others it was but the natural consequence of the careless and slipshod methods followed in its application by some of the British veterinarians. The existence of this prejudice necessitated a good deal of discussion and explanation, which, I am glad to say, appeared to have an excellent effect on many of those interested. The leaders of the veterinary profession in Britain are, to a man, in favour of the test as the best means of detecting tuberculosis, with a view to the adoption of intelligent means for its gradual eradication, and as a result of their efforts and of the action of the various foreign and colonial governments in insisting on its use, a more healthy public opinion is rapidly being created, which will soon lead to a marked improvement in the health of the herds.

That some such improvement is required, will be evidenced by the results of the work done during the past season on behalf of your department. Of the 475 cattle tested, as above stated, 357 passed satisfactorily, while 118 reacted, and were rejected as tuberculous. Of 358 cattle one year old and over, 112 reacted, while of 117 under one year, six only were found affected. Dealing with Shorthorns alone, the figures are as follows:—Of 299 animals one year old and over, 195 passed the test, and 104 were rejected, while of 106 head under one year, 100 were found free from disease, and six only failed to pass.

These figures show very conclusively that by the adoption of intelligent methods, the eradication of bovine tuberculosis can be achieved with much less difficulty and at a smaller pecuniary sacrifice than is generally supposed.

I regret that, owing to the pressure of work, I was unable to comply with your request that I should attend the International Congress on Tuberculosis, which was held in London in July. I had, however, the privilege of several interviews with Principal McFadyean, of the Royal Veterinary College, who is admittedly the highest authority on bovine tuberculosis in the English-speaking world, and who very kindly allowed me to benefit by his extensive experience. To Principal Dewar, of the Royal (Dicks) Veterinary College, Edinburgh and to Principal McCall, of the Glasgow Veterinary College I am also indebted for much valuable information, which was of great assistance to me in the performance of my duties.

The last shipment of cattle to Quebec for this season will leave Glasgow November 1, and in pursuance of the arrangement previously made with you, I will at once take passage for Canada.

I have the honour to be, sir,
Your obedient servant,

The Honourable
The Minister of Agriculture,
Ottawa.

J. G. RUTHERFORD, V.S.

No. 37.

BOARD OF AGRICULTURE.

MEMORANDUM AS TO THE IMPORTATION OF DOGS INTO GREAT BRITAIN FROM ABROAD.

1. The disease of rabies in dogs and of hydrophobia in man, which remains prevalent in almost all other parts of the world, has become practically extinct in this country, and the regulations of the Board are designed to prevent its re-introduction.

2. The importation of dogs into Great Britain from any foreign country, or British possession other than the Channel Islands, without the sanction of the Board is prohibited by orders made under the Diseases of Animals Act* ; and the landing of a dog from abroad (whether originally exported from Great Britain or not) will, unless a license has previously been obtained, render the owner liable to a penalty of £20 and the possible seizure of the dog.

3. Every person who wishes to import a dog must make application in writing for the necessary license, on a form which will be supplied for the purpose, and the form should be accompanied by a letter addressed to the Secretary, Board of Agriculture, 4 Whitehall Place, London, S.W., explaining the circumstances under which the application is made, and stating how long the dog has been in the possession and personal charge of the applicant. It is to be understood, however, that an application is not necessarily followed by the issue of a license to land the dog, and that the Board cannot sanction the landing of dogs which usually live abroad, but which their owners while on a visit to this country wish to bring with them.

4. Every application must be made by the person who will be the owner of the dog during the period of detention in this country, and it should be forwarded in sufficient time to enable the Board to make full inquiries into the circumstances and as to the suitability of the premises in which it is proposed that the dog should be isolated, and to permit of their decision being communicated to the applicant before the dog is embarked. Masters of vessels cannot properly accept a dog for shipment to Great Britain from abroad unless the license is produced at the port of embarkation, and they are liable to prosecution if the dog is landed illegally.

5. In order that the Board may have it on record, that the conditions on which alone a license can be issued are fully understood, the applicant must sign the undertaking set out in one or other of the forms.

6. Unless the dog to be imported has, at the date of the application, been in the personal charge of the applicant during the preceding three months, the Board can only authorize its landing under a license, Form A, requiring the detention and isolation of the dog for six months. Such licenses are only issued where arrangements have previously been made for the detention of the dog for that period at an isolation station approved by the Board, at the expense of the owner, and at his risk. At the present time the only isolation station so approved is the Dog Sanatorium, Beddington Lane, Mitcham, Surrey, to the manager of which establishment communications respecting terms, &c., should be addressed.

7. Dogs landed with licenses, Form A, should be forwarded in crates or hampers, and with the utmost possible expedition, to the isolation station.

* NOTE.—The Dogs (Landing from Ireland) Order of 1899 imposes similar restrictions on the landing in Great Britain of dogs from Ireland.

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8. If, however, the applicant is able to declare that the dog has been his personal charge for three months, he may apply for a license, Form B, which requires the detention of the dog for a period of six months on some suitable private premises to be specified by the applicant, and approved by the Board, where the dog will be under the supervision of the officers of the Board and of the local authority, for whose inspection it should be produced when required. If, however, the general conditions imposed are properly carried out, the Board are prepared, on the production of a certificate of a duly qualified veterinary surgeon that the dog is not affected with, or suspected of, rabies, to consider applications for the release of the dog after a period of ninety days.

9. The applicant's private place of residence is regarded in most instances as a suitable place of detention for a dog detained under a license, Form B, provided that he is the householder, and that no other dogs are kept upon the premises. Hotels, flats, lodgings, barracks or other similar premises where the dog cannot be conveniently isolated, or where the owner of the dog cannot guarantee that the animal can be detained for the full period required by the Board, are not regarded as suitable places of detention. For a similar reason, private residences are seldom suitable where more than one dog is to be imported. If the applicant has no fixed residence where the dog can be kept under his own charge, arrangements should be made for the detention of the dog for the necessary period at an isolation station, or on the premises of an experienced veterinary surgeon.

10. On arrival at a port in Great Britain, and before the dog can be landed, the holder of the license is required to produce it for the inspection of the officer of Her Majesty's Customs.

11. The license requires the dog when landed, to be taken by the nearest available route, and without unnecessary delay, to the premises specified therein and the arrival of the dog there must at once be notified in writing to the Board.

12. Where, however, dogs admitted under a license, Form B, are landed late in the day, and the place of detention is distant from the port, the Board do not object to the journey of the dog being broken by its detention at some suitable place for one night, provided that it is kept apart from all other dogs, and that the journey is thereafter completed with reasonable dispatch.

13. The license should be retained by the person in charge of the dog who is responsible for compliance with the conditions prescribed in the license. The license must be returned to the Board at the end of the period of detention, or at once if it is not made use of.

14. The dog cannot in any case be moved from the place of detention to other premises in the United Kingdom without a further license from the Board. Where the Board are satisfied that exceptional circumstances have arisen which render the removal of a dog detained under a license, Form B, necessary or expedient, they are prepared to consider an application for a removal license, provided it is not proposed to remove the dog from a rural to an urban district, or from the original premises to a less suitable place of detention. Unless the dog is to be taken from the private residence of the owner to another house in his occupation, the premises of an experienced veterinary surgeon should be specified as the place of detention, and the removal cannot be authorized unless the dog can be detained at the second address for the remainder of the period of detention.

15. Where satisfactory arrangements of the character above indicated cannot be made by the owner, the dog must be detained at the premises first specified, or removed to such place as the Board may direct.

16. During the period of detention under a license, Form B, the dog, when temporarily moved for exercise as provided in the license, must be properly muzzled with a wire cage muzzle, and in charge of a competent person, and the former condition is also applicable when the dog is likely at any time to be brought into contact with other dogs.

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17. Should a dog die, or be lost, whilst under detention, the fact should be at once reported to the Board, together with full information as to the symptoms preceding death, or the circumstances in which the loss took place. In the event of the dog sickening with any of the symptoms of rabies, it should be at once isolated, and the advice of a veterinary surgeon obtained.

18. A dog detained under a license of the Board cannot be moved to a vessel for exportation without a further license of the Board.

19. Licenses are issued by the Board to land performing dogs, if it can be shown that the dogs have been trained to take part in performances for the entertainment of the public, and that they are to be imported for that purpose only, and that they are under an actual engagement to perform immediately on arrival. These licenses require that during a period of 90 days dogs so admitted shall be isolated from contact with all other dogs, that they shall not be taken into any public place unless properly muzzled in the manner set out in the license, and that during that period the Board shall at all times be kept informed of the premises upon which the dogs are detained. Satisfactory evidence must also be afforded that the animals are habitually kept apart from all other dogs, whether in this country or abroad.

20. For the convenience of persons passing through Great Britain the Board are prepared, in special cases, to issue licenses for the landing of dogs to be exported within a very few days. Applications for such licenses should specify the ports, the names of the vessels, the dates of their arrival and departure, and the address of some suitable place where the dog can be detained during the period that it remains in Great Britain. The license in this case should be endorsed by an officer of the vessel of departure, and returned to the Board by the owner. The dog cannot again be landed in Great Britain without a further license.

21. The experience of the Board has clearly shown that the frequent movement of pet dogs to and from the Continent involves this country in serious danger, inasmuch as a pet dog may become infected with rabies without the knowledge and despite the utmost care on the part of its owner. It is therefore a matter of great importance to owners of dogs in Great Britain that dogs from abroad should only be admitted in instances where it has been satisfactorily established that some useful purpose will be served by their admission, or where a pet dog would otherwise be separated from its owner for a prolonged period. Pet dogs should not be taken abroad and thus exposed to the risk of infection, except in cases of real necessity.

22. The Board earnestly invite the cordial co-operation of dog owners in carrying out regulations which have been designed with a view to minimize the risk of re-introducing a very terrible disease.

T. H. ELLIOTT,
Secretary.

Board of Agriculture,
4, Whitehall Place,
London, S.W.,
August 8, 1900.

*Copies of this Memorandum may be obtained on application to the Secretary of the
Board of Agriculture at the above address.*

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